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MATERIAL - GLASS CLOTH REINFORCED PLASTICS - ROOM AND ELEVATED TEMPERATURE - PROPERTIES OF

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ROOM & ELEVATED TEMPERATURE - PROPERTIES OF

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MATERIAL - GLASS CLOTH REINFORCED PLASTICS

ROOM & ELEVATED TEMPERATURE - PROPERTIES OF

PURPOSE:

The purpose of this investigation was to establish design allowables for glass-cloth reinforced plastic panels with the following fabric and resin combinations:

181 Cloth with Class II (Laminac 4232) resin
181 Cloth with Class III (Conolon 506) resin
181 Cloth with Class IV (Epon 828) resin
143 Cloth with Class II (Laminac 4232) resin
143 Cloth with Class III (Conolon 506) resin
143 Cloth with Class IV (Epon 828) resin
120 Cloth with Class II (Laminac 4232) resin
120 Cloth with Class III (Conolon 506) resin
120 Cloth with Class IV (Epon 828) resin
183 Cloth with Class II (Laminac 4232) resin
183 Cloth with Class III (Conolon 506) resin
183 Cloth with Class IV (Epon 828) resin

In Part I of FGT-2186, the fabrication history and material source is included with the physical and mechanical properties of each panel. Compression testing was not completed at the time of publication of Part I. This report presents the results of the compression tests which complete this investigation.

SUMMARY:

Compression properties on 12 different cloth-resin combinations were obtained. Testing was done at R.T., 300 and 500 F. Properties were obtained at angles of 0, 45, and 90° to warp direction. The effect of soaking in boiling water on the RT compression properties was also determined.

From each compression specimen the ultimate compressive strength and compressive modulus was determined and recorded. Laminates made with 181 cloth had values for compressive strength in the warp direction which were approximately equal to these properties when tested 90° to the warp direction. The properties at 45° to the warp direction, however, were reduced by approximately 50%.

Specimens of 181 cloth with Class II (4232) resin retained slightly less than 50% of their room temperature compressive strengths at 500 F. Average compressive strength values of specimens of 181 cloth with Class III (506) resin show that this material retained approximately 60 to 70% (depending on the specimen direction) of its room temperature compressive strength, at 500 F. Specimens of 181 cloth with Class IV (828) resin retained less than 50% of their room temperature strength at 300 F. The compressive strength of this material was below 5 ksi at 500 F, a decrease of over 90% of the room temperature value at 0 and 90° to the warp direction.

For laminates made with 143 type cloth the average valuesof compressive strength at 45 and 90° to the warp direction were approximately equal. These values are less than 45% of the values obtained parallel to the warp direction.

The following treatments had no effect on the compressive properties at 300 F for the materials listed:

Materials	Treatment
181 Cloth with Class II (4232) resin 181 Cloth with Class III (506) resin 143 Cloth with Class II (4232) resin	Soaked at 300 F for 100 hrs. while stressed to 20 or 40% of their room temperature compressive strengths.
181 Cloth with Class IV (828) resin	Soaked at 300 F for 100 hrs. while stressed to 20% of its 300 F compressive strength.

As part of this investigation an evaluation of compression test procedures for fiberglass was made. Four test set-ups were evaluated and appeared to have about the same accuracy. The Federal Specification LP-406B compression jig using a Baldwin PC7M compressometer was the least dependent on operator technique. For this reason it was considered superior to other methods at temperatures up to 300 F, which is the operating limit of its strain measuring system. The Convair-built leaf type compression jig was used satisfactorily for the 500 F tests.

MATERIAL - GLASS CLOTH REINFORCED PLASTICS

ROOM & ELEVATED TEMPERATURE - PROPERTIES OF

OBJECT:

1. To determine the compression properties at room and elevated temperatures for various glass fabric and resin combinations of plastic laminated materials. The following combinations were tested: 120 cloth, 143 cloth, 181 cloth, and 183 cloth with Class II (Laminac 4232), Class III (Conolon 506), and Class IV (Epon 828) resins, as specified in FMS-0031(A), at 0, 45, and 90° to the direction of warp of the material.

2. To evaluate the different test procedures for obtaining compression properties.

PROCEDURE:

Sixty glass reinforced plastic panels, numbered 101 through 160, of the following glass fabric and resin combinations were fabricated at Convair, Fort Worth:

Panel Number	Glass Fabric	Resin as Specified In FMS-0031A	Panel Size (In.)
101-105	181 Cloth	Class II (4232)	26 x 24
106-110	181 Cloth	Class III (506)	26 x 24
111-115	181 Cloth	Class IV (828)	26 x 24
116-120	143 Cloth	Class II (4232)	24 x 22
121-125	143 Cloth	Class III (506)	24 x 22
126-130	143 Cloth	Class IV (828)	24 x 22
131-135	120 Cloth	Class II (4232)	14 x 12
136-140	120 Cloth	Class III (506)	14 x 12
141-145	120 Cloth	Class IV (828)	14 x 12
146-150	183 Cloth	Class II (4232)	14 x 12
151-155	183 Cloth	Class III (506)	14 x 12
156-160	183 Cloth	Class IV (828)	14 x 12

A fabrication history, a list of vendors who supplied the materials, and various physical and mechanical properties for each panel are included in Part I of this report.

Compression properties were determined for each condition shown in Table I. Four specimens, one from each of four panels of each fabric and resin combination were tested in the conditions indicated. To retain identity, each specimen was marked with the panel number from which it was taken and the letter A, B, or C, depending on the directionality with relation to the warp. The letter A signifying that it was parallel to the warp, B, that it was 45° to the warp direction and C, that it was 90° to the warp direction.

Since there were no standardized test procedure for obtaining compression properties of plastic laminates, several fixture arrangements were used in the course of the testing to evaluate the different procedures. The following fixtures were used:

1. Convair-built spring leaf support type (Figure 1). This jig was used for 26% of the testing including all tests at 500 F.

2. Federal Specification LP-406B jig with Baldwin B-3M extensometer, (Figure 2A). This was used for 51% of the tests.

3. Federal Specification LP-406B jig with Baldwin PC-7M compressometer, (Figure 2B), used for 21% of the tests.

4. Federal Specification LP-406B jig with extension arms extending out of the test oven (Figure 3) to a microformer extensometer. An evaluation of this fixture was published in FGT-1735. In this investigation it was used at room temperature for 3% of the tests.

A comparison of the performance of the four test fixtures was made on 2024-T86 aluminum specimens at room temperature.

In the Convair built leaf type jig, the specimen is supported by leaves which can deflect. Figure 1 shows the leaves in the open position for reloading. A thermocouple extends through the leaves and touches the center of the specimen. Strain is measured over a 1" gage length on the centerline of the supported faces of the specimen. The strain from the faces is averaged and autographically recorded.

The following procedure was used for testing with the LP-406B jig. The screws which fastened the supporting plates were hand tightened. The top compression head was rigidly attached to the test machine. The bottom compression head rested on three threaded studs which were adjusted so that the specimen was loaded uniformly at the ends. A thermocouple was attached to the side of the specimen along the reduced section.

Specimens were machined to the dimensions shown in Figure 4. All specimens were loaded at a constant rate such that failure occurred in approximately 2 to 3 minutes. Tests were conducted on 60,000 and 5,000 lb. capacity Baldwin universal test machines. Compression load vs. strain curves were recorded autographically. Heating for elevated temperature tests was accomplished with circulating air ovens.

In order to determine the effect of exposure for 100 hours at 300 F under sustained compressive stress, specimens were loaded in Riehle creep-rupture machines using the jig shown in Figure 5. The bolts holding the support plates on the sides of the specimen were hand-tightened. The loading was at 20 or 40% of the average compressive strength at room temperature. After loading for 100 hours, each specimen was removed and tested in compression at 300 F. An exception to this procedure was used for specimens taken from panels fabricated using 181 cloth with Class IV (828) resin. Because the compressive strength of this material at 300 F is less than 45% of the room temperature compressive strength, the loads were 20% of the average compressive strength at 300 F.

RESULTS:

The compression properties for each specimen are given in Tables II through IX, and are shown graphically in Figures 6 through 12. Typical compression stress-strain curves for each condition are shown in Figures 13 through 28.

DISCUSSION:

The compressive moduli for two of the laminates at elevated temperature could not be determined from the load-strain curves because the materials deformed inelastically at very low stresses. This low elasticity and strength were exhibited by the 181 and 143 cloth laminates bonded with 828 resin. The stress-strain

curves for these materials at some elevated temperature test conditions could only be represented as shaded areas as shown in Figures 20 and 26.

Compression failures occurred in one of three ways - crushing or buckling the material along the reduced section of the specimen, crushing either end of the specimen, or by delaminating. Delamination failures are those in which the bonds between the layers of cloth were broken and the layers separated. End failures occurred because the ends of specimens were somewhat weakened from the machining operation. The compressive strength tabulated for specimens on which end failures occurred was obtained by dividing the maximum load by the minimum cross sectional area of the specimen. Such values are not included in the averages in Tables II through IX and are lower than the compressive strength for the specimen. The location of failure is included for each specimen in the data sheets.

For laminates made with 181 cloth (see Figures 6, 7, and 8) the average values for compressive strength and modulus measured parallel to the warp direction were approximately equal to these properties when measured 90° to the warp direction. The average values measured 45° to the warp direction were approximately half the parallel and 90° values.

Specimens made of 181 cloth with Class II (4232) resin retained slightly less than 50% of their room temperature compressive strengths at 500 F in each of the three directions tested. The average compressive strength values of specimens made of 181 cloth with Class III (506) resin and tested at 500 F show that this material retained 60 to 70% of its room temperature strength at 500 F, depending on the specimen direction. The compressive strength of 181 cloth with Class IV (828) resin was less than 50% of its room temperature value at 300 F and below 5 ksi at 500F. This represented a decrease of over 90% of the room temperature values in the 0 and 90° to the warp direction. The elevated temperature compressive properties of 181 cloth laminates were not affected by stressing and soaking for 100 hours at 300 F.

Laminates made using 143 cloth had average values for compressive strength at 45 and 90° to the warp direction which were approximately equal. Values for these directions at room temperature were 30 to 45% (depending on the resin) of the average compressive

strengths obtained parallel to the warp direction. No significant effect on the 300 F properties was observed on specimens of 143 cloth with Class II (4232) resin due to loads at 300 F of 20 or 40% of the room temperature strength for 100 hours. (See Table V).

Testing experience with the four test set-ups established the LP-406B fixture with the Baldwin PC-7M compressometer (Fixture 3) as the preferable one for temperatures up to 300 F. The Convair leaf type jig was satisfactory at higher temperatures.

The accuracy of the fixtures was not rigorously determined in this investigation, but was nominally the same for all the fixtures when checked on .125" thick 2024-T86 aluminum specimens. The accuracy obtained with jig No. 2 which employed a non-averaging extensometer, was greatly affected by any lack of parallelism of the specimen ends.

The No. 3 fixture was found to be the least dependent on operator technique in attaching the strain measuring system to the specimen. Because of this, the No. 3 fixture permits testing to proceed faster than with other jigs and with the least chance for operator error. Its use is limited to a miximum temperature of 300 F, which is the operating limit for the PC-7M compressometer.

CONCLUSIONS:

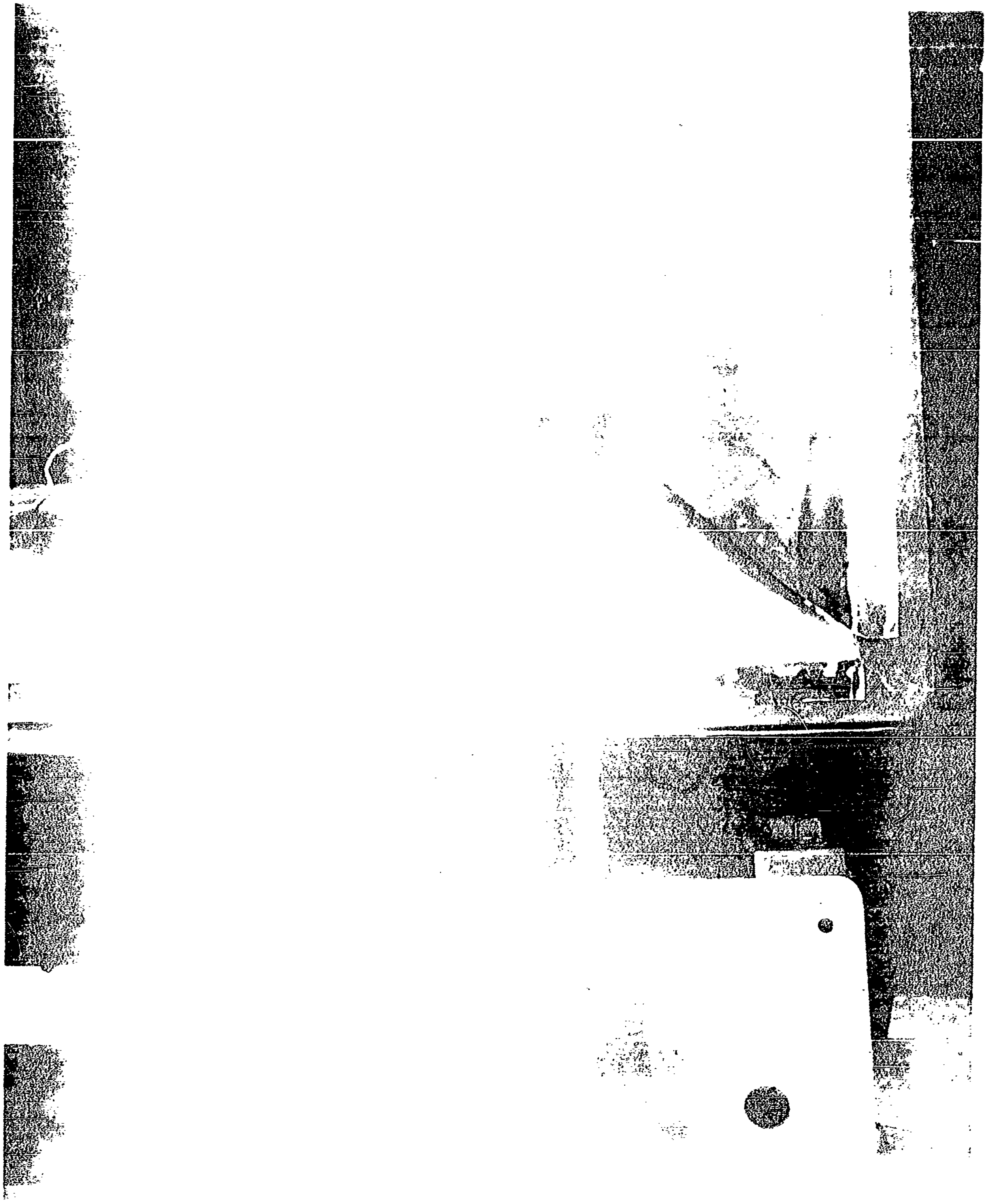
The results of this investigation consist of empirical data to be used in establishing design allowables at room and elevated temperatures for all combinations of the following fabrics and resins; types 181, 143, 120, and 183 cloths with Class II (Laminac 4232), Class III (Conolon 506) and Class IV (Epon 828) resins. From the data obtained the following general conclusions are drawn:

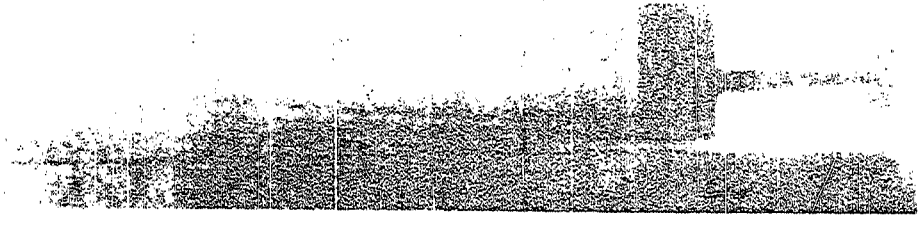
1. Laminates made using 181 cloth had compression strengths parallel to and at 90 degrees to the warp direction which were approximately twice the strength of the material at 45° to the warp direction.

2. Laminates made using 143 cloth had compression strengths which were approximately equal at 45 and 90° to the warp direction. These properties were 55 to 70% (depending on the resin used) less than the strength parallel to the warp direction.

3. Exposures for 100 hours at 300 F at loads of 20 or 40% of the room temperature compressive strength had no effect on the compressive properties at 300 F parallel to the warp direction for the following cloth and resin combinations: 181 cloth with Class II (4232) resin, 181 cloth with Class III (506) resin, and 143 cloth with Class II (4232) resin. Similar exposures at loads of 20% of the 300F compressive strength had no effect on the compressive properties at 300 F for 181 cloth with Class IV (828) resin.

4. The Federal Specification LP-406B jig with a Baldwin model PC-7M compressometer was the easiest and fastest combination to use for tests up to and including 300F. The Convair built leaf type compression jig was satisfactory for 500 F tests.





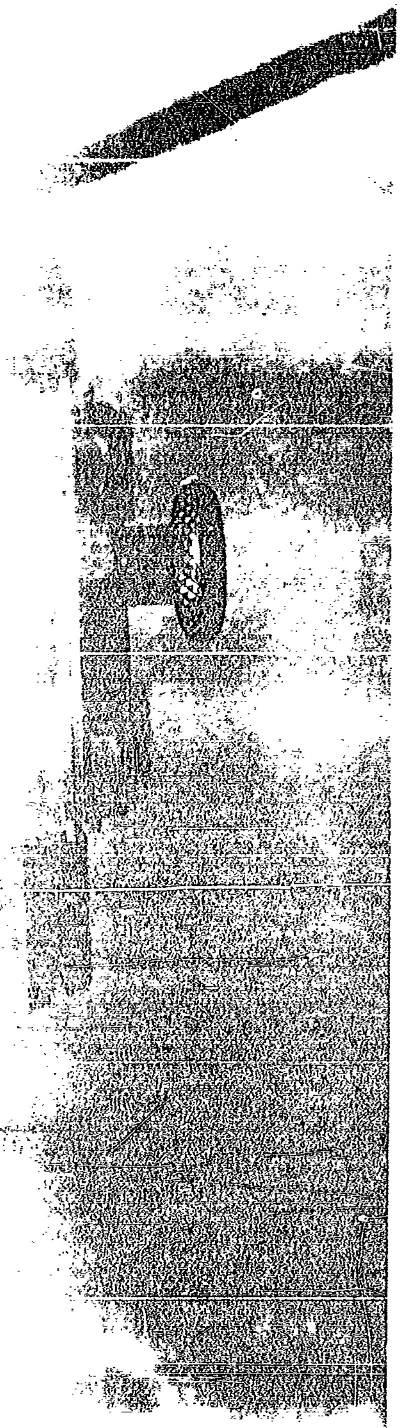
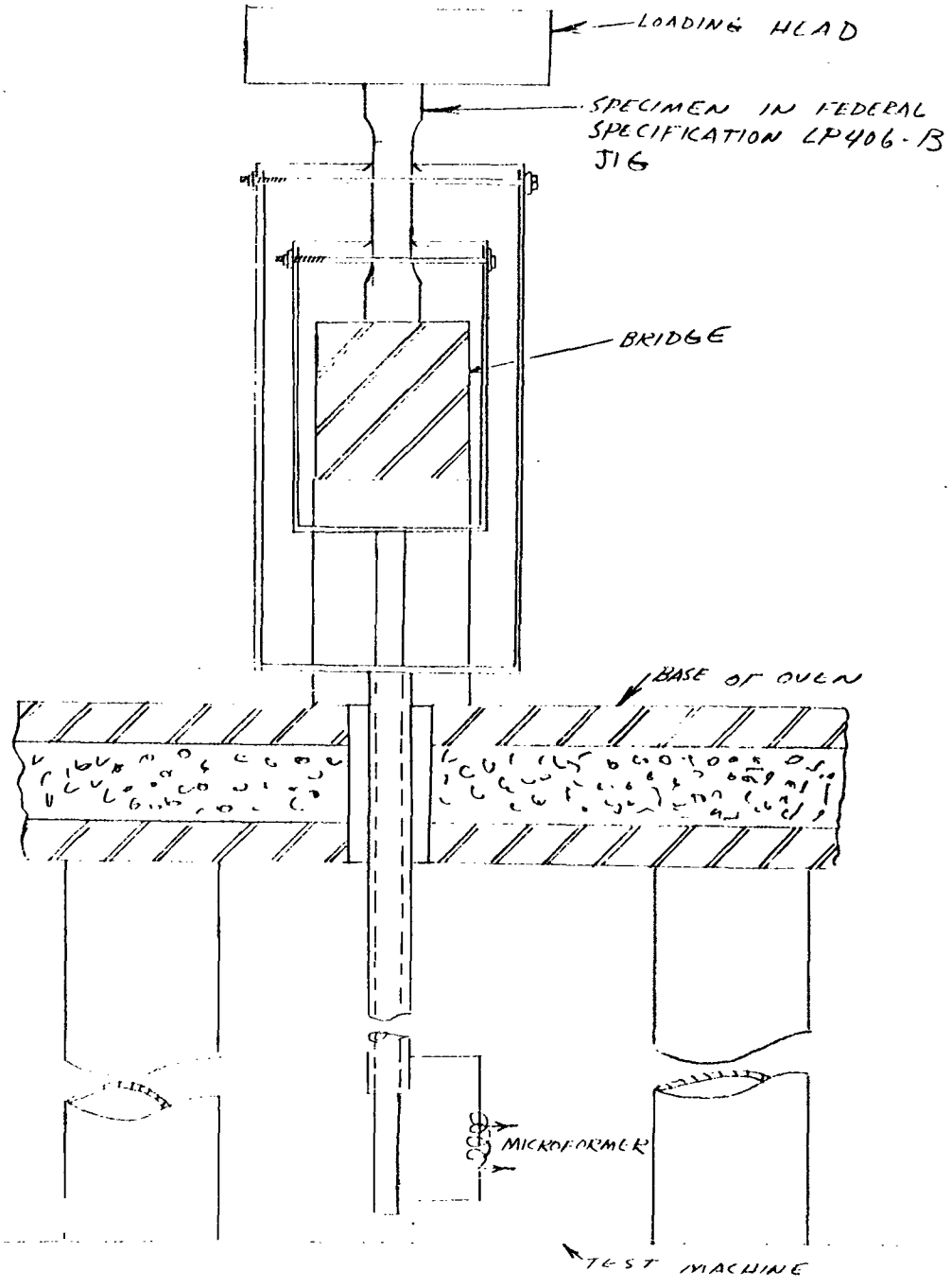
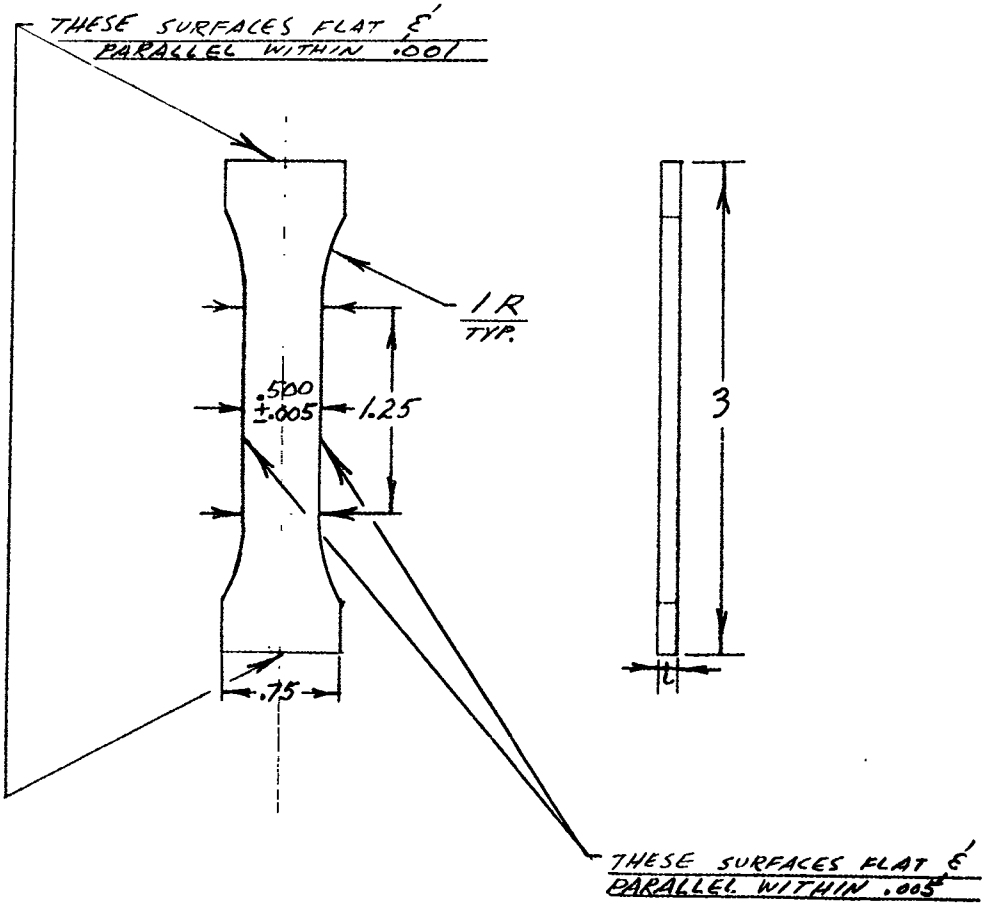


FIGURE 5

SET UP FOR LOADING JIG WITH EXTENSION ARMS

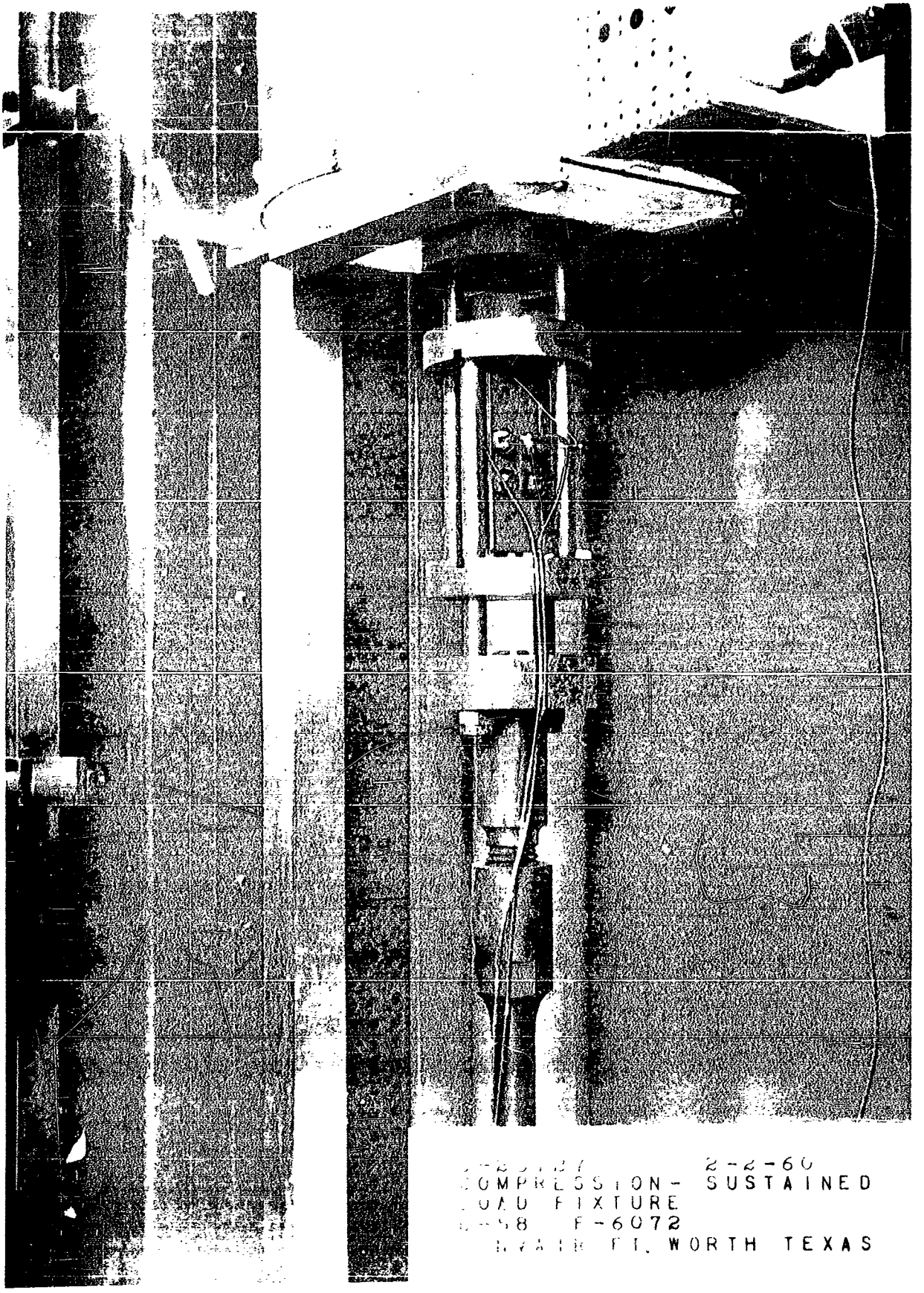




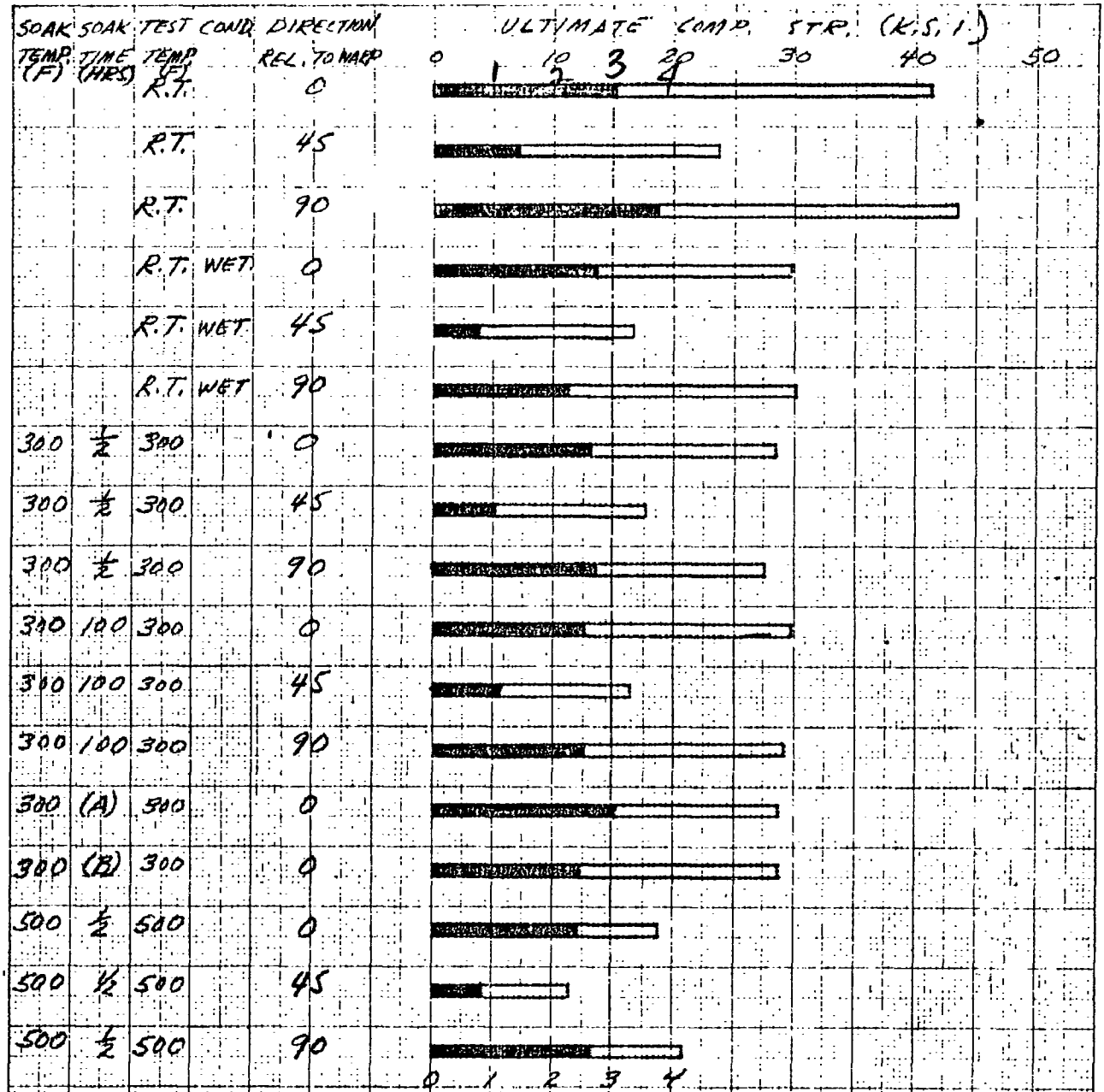
t - THICKNESS OF FIBERGLASS PANEL

COMPRESSION SPECIMEN

FIGURE 4

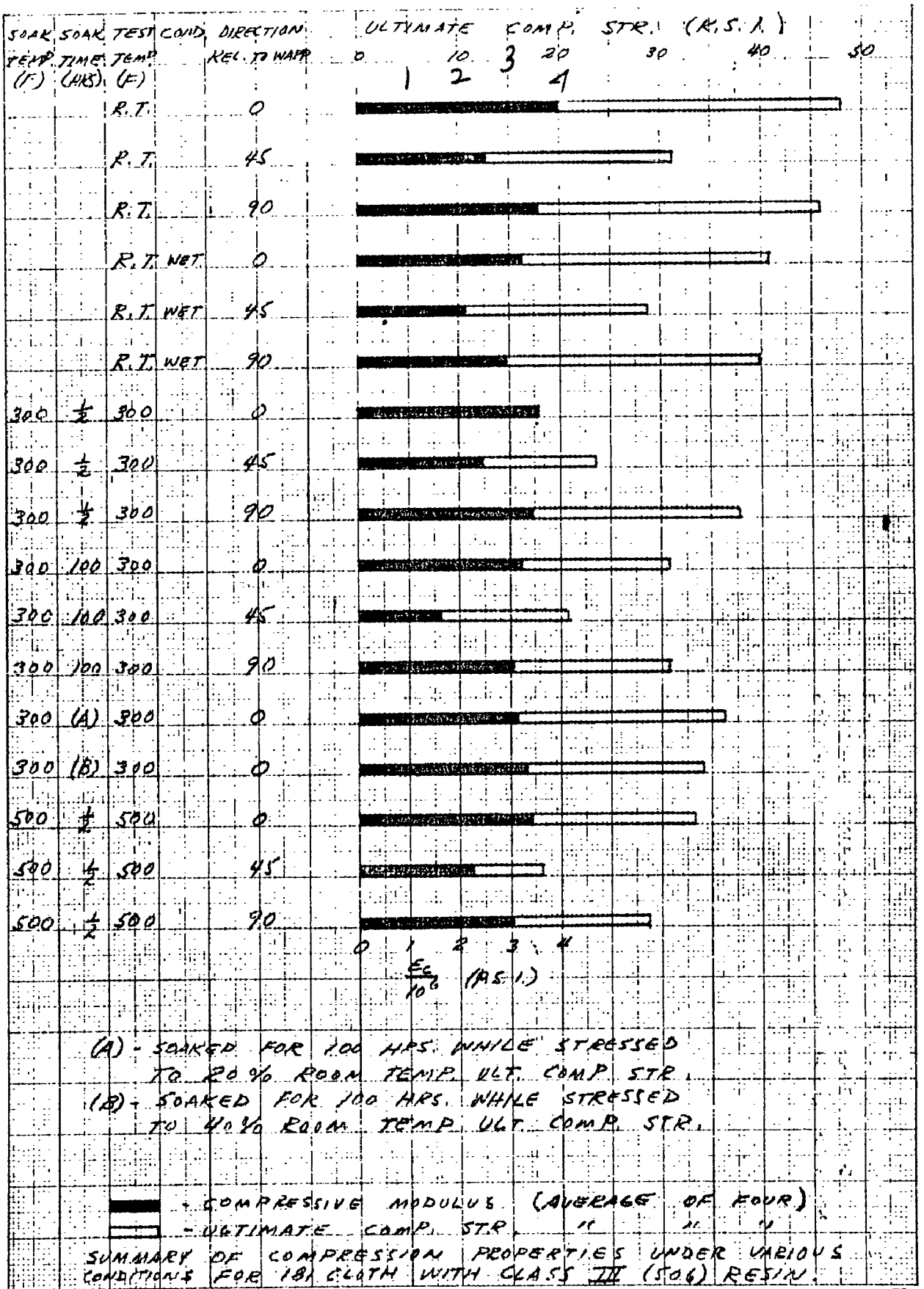


2-2-60
COMPRESSION- SUSTAINED
LOAD FIXTURE
F-6072
FT. WORTH TEXAS



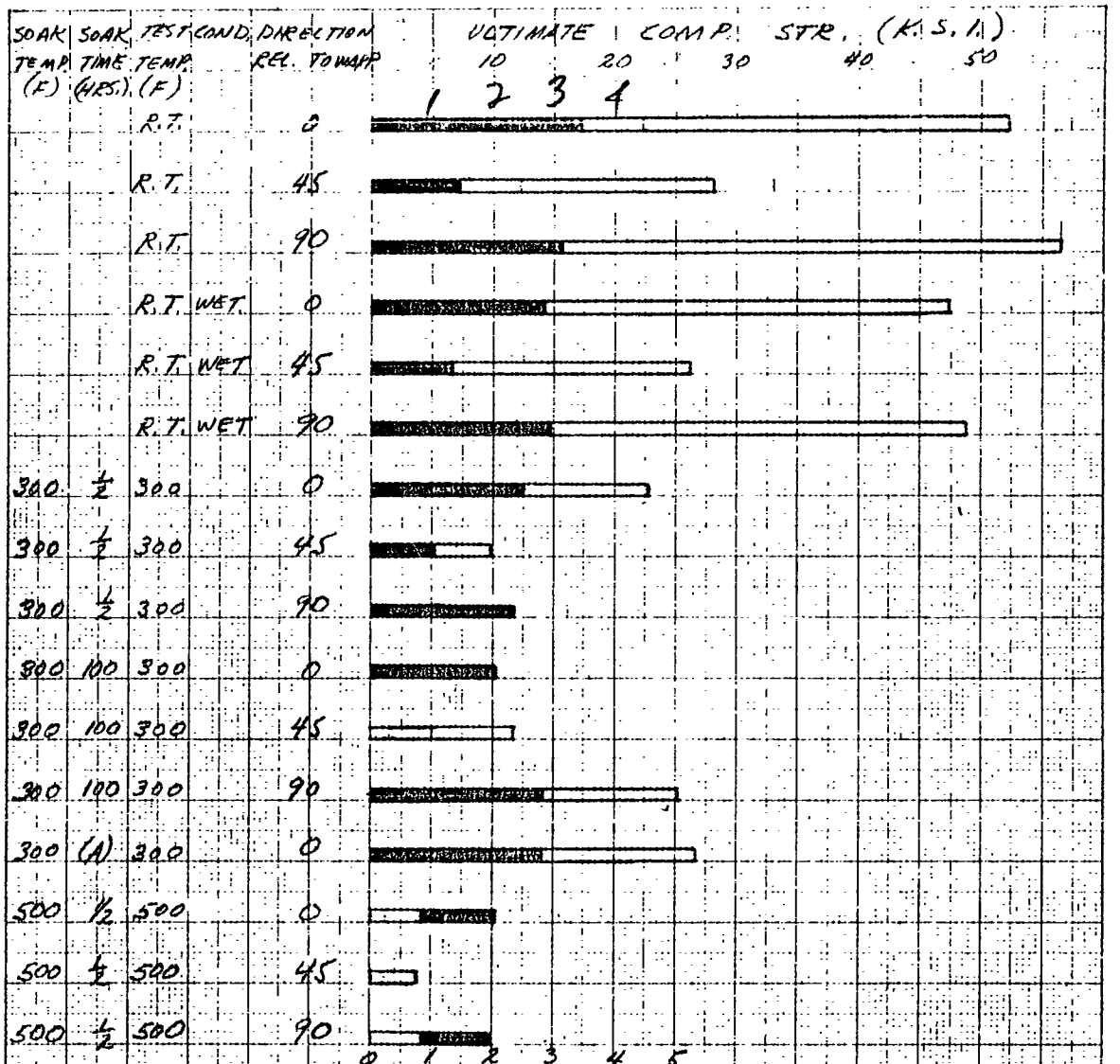
SUMMARY OF COMPRESSION PROPERTIES UNDER VARIOUS CONDITIONS FOR 181 CLOTH WITH CLASS II (423?) RESIN

FIGURE 6



SUMMARY OF COMPRESSION PROPERTIES UNDER VARIOUS CONDITIONS FOR 181 CLOTH WITH CLASS III (506) RESIN.

FIGURE 7



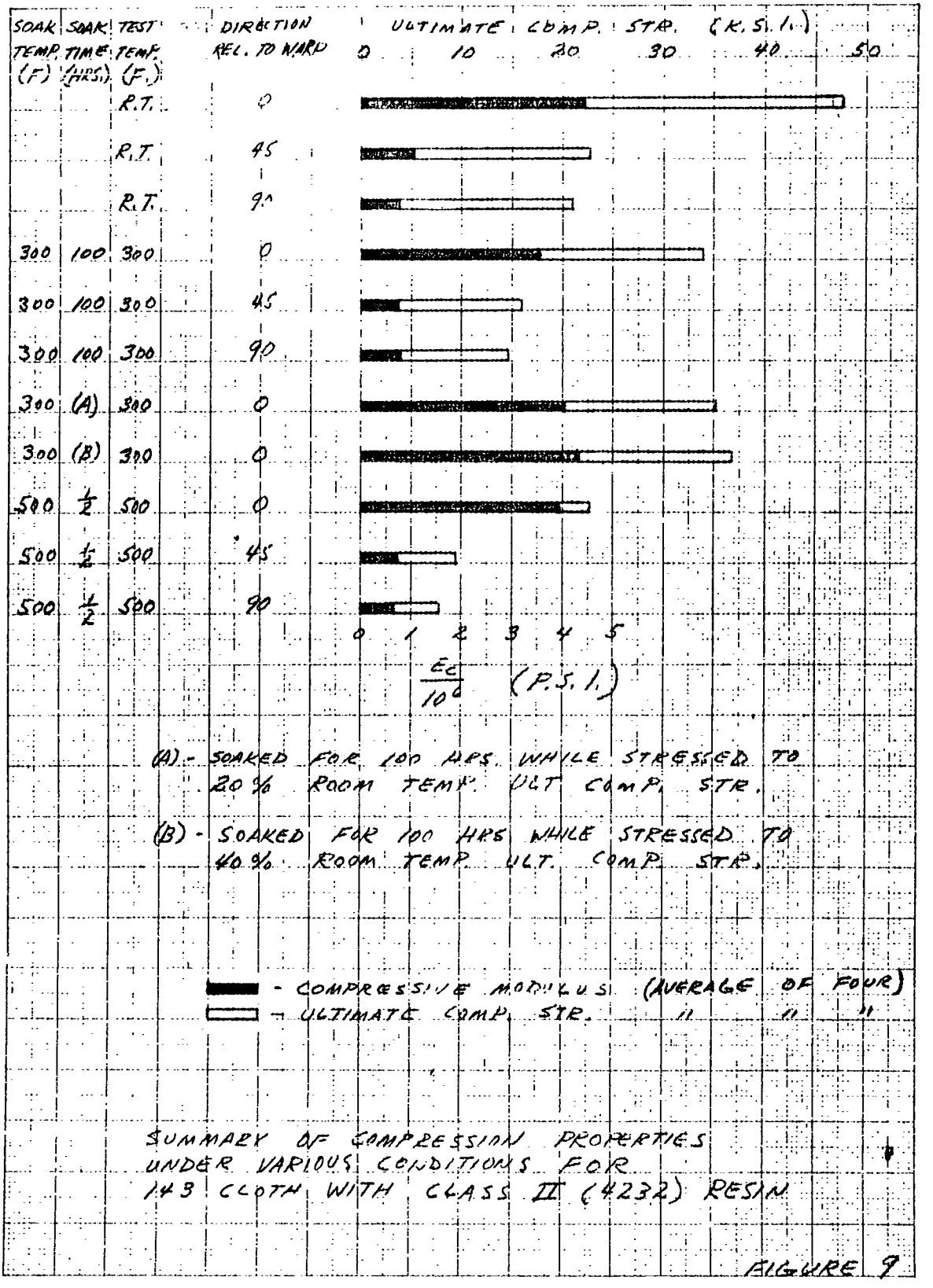
(A) - SOAKED FOR 100 HRS. WHILE STRESSED TO 20% 300 F. ULTIMATE COMP. STR.

▬ - COMPRESSIVE MODULUS, (AVERAGE OF FOUR)

▭ - ULTIMATE COMP. STR., " " "

SUMMARY OF COMPRESSION PROPERTIES UNDER VARIOUS CONDITIONS FOR 181 CLOTH WITH CLASS IV (828) RESIN

FIGURE 8



SUMMARY OF COMPRESSION PROPERTIES UNDER VARIOUS CONDITIONS FOR 143 CLOTH WITH CLASS II (4232) RESIN

FIGURE 9

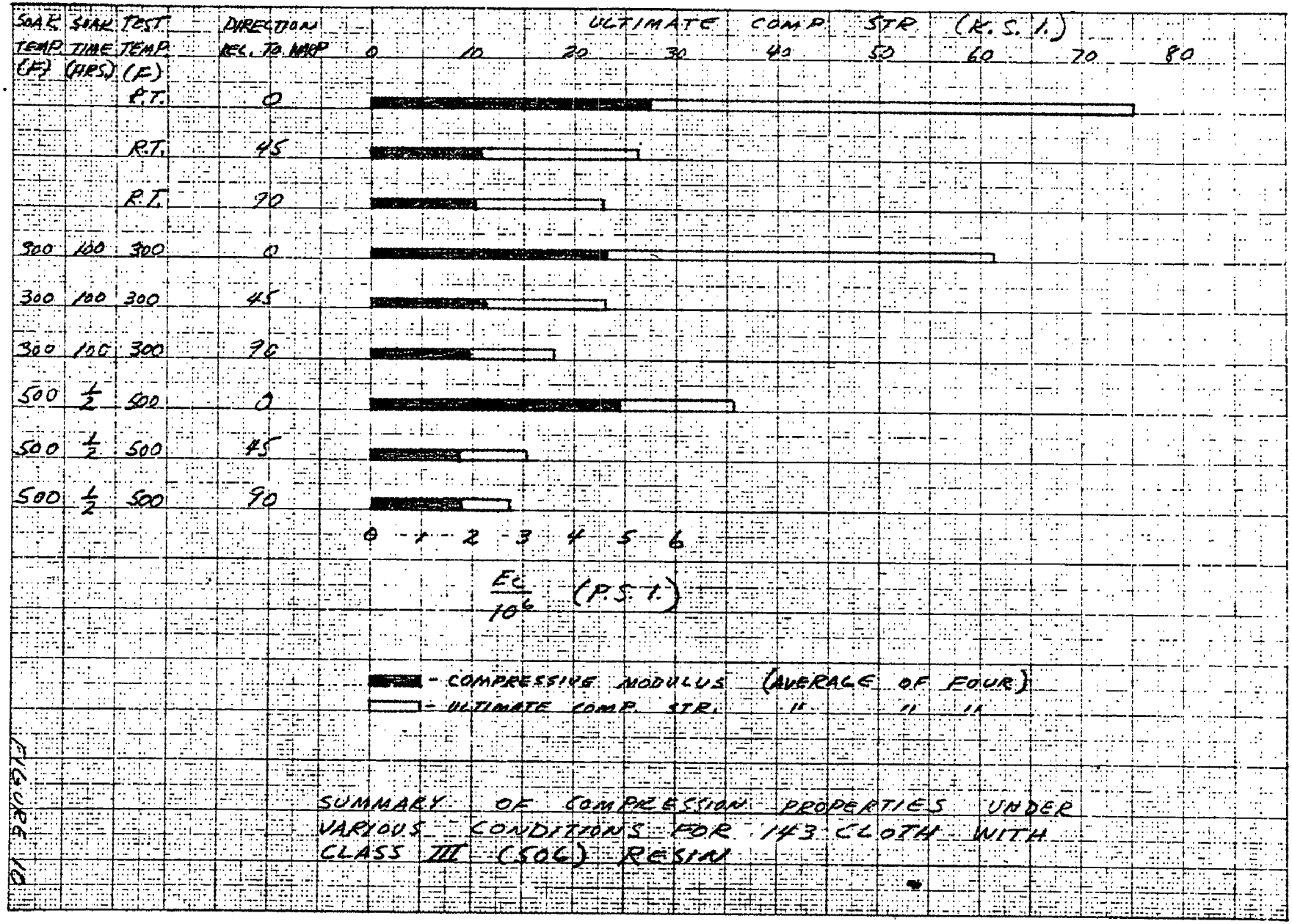


FIGURE 10

SUMMARY OF COMPRESSION PROPERTIES UNDER VARIOUS CONDITIONS FOR 143 CLOTH WITH CLASS III (SOG) RESIN

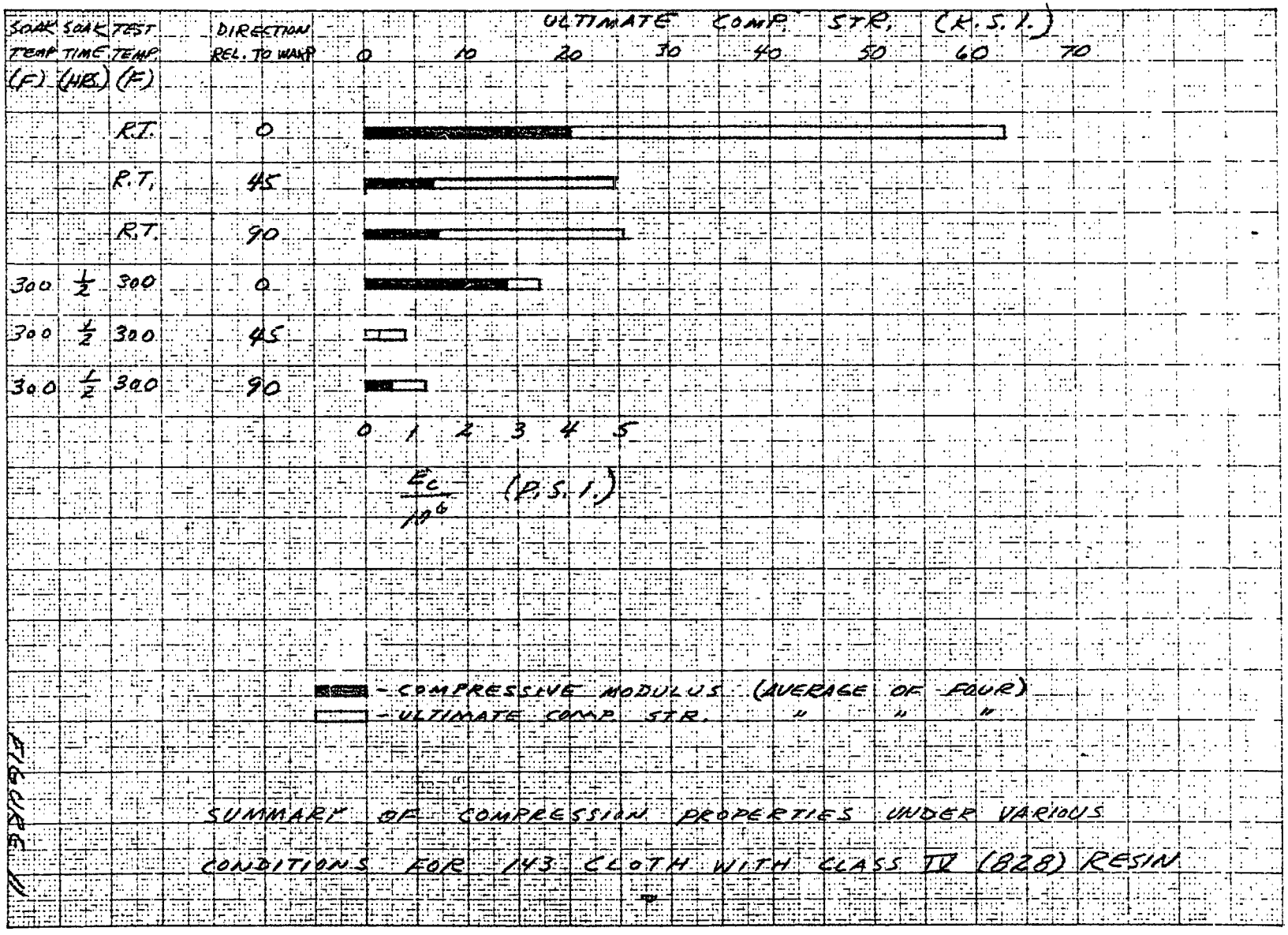
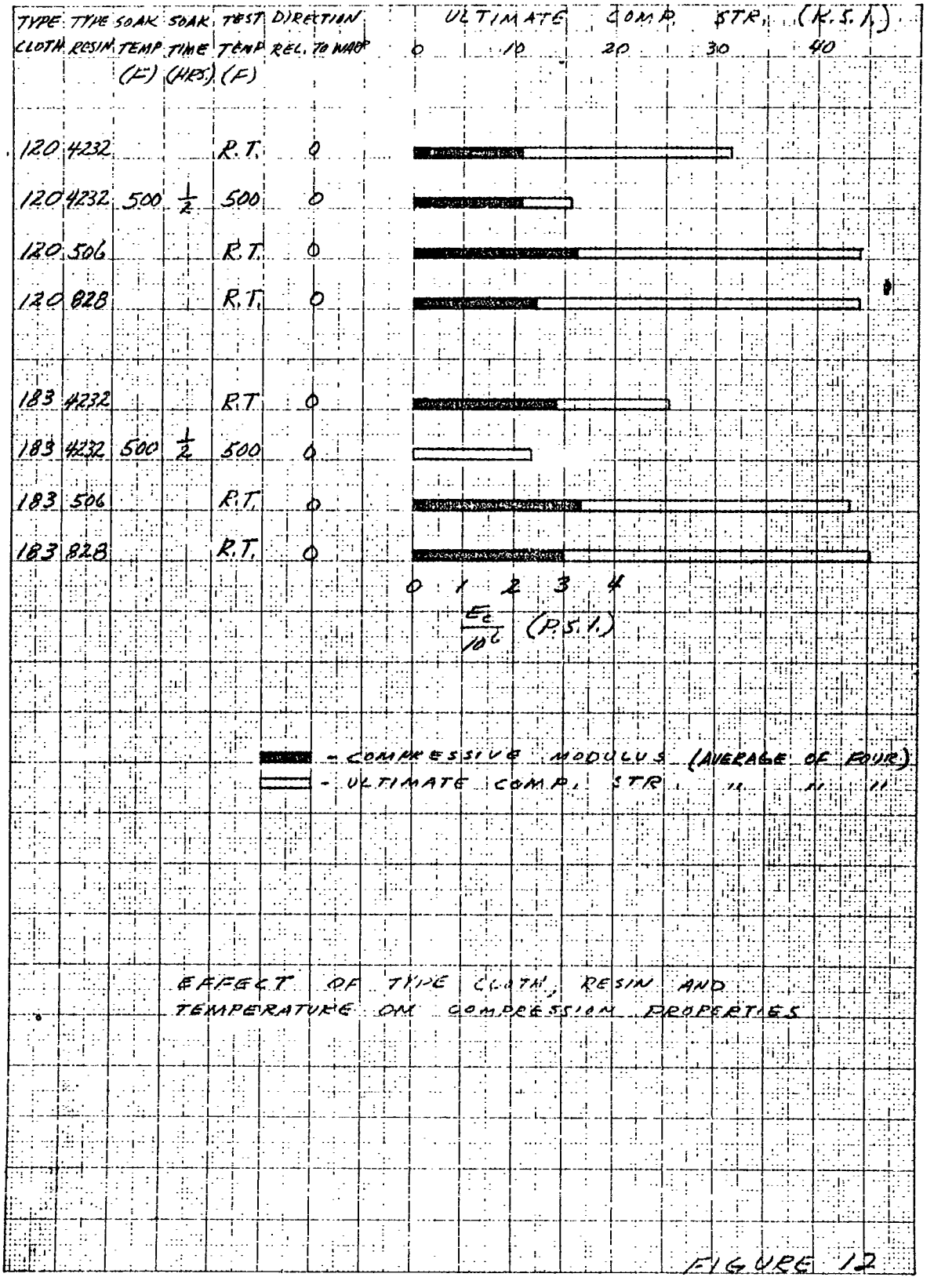


FIGURE 11

SUMMARY OF COMPRESSION PROPERTIES UNDER VARIOUS CONDITIONS FOR 143 CLOTH WITH CLASS IV (828) RESIN



EFFECT OF TYPE CLOTH, RESIN AND TEMPERATURE ON COMPRESSION PROPERTIES

FIGURE 12

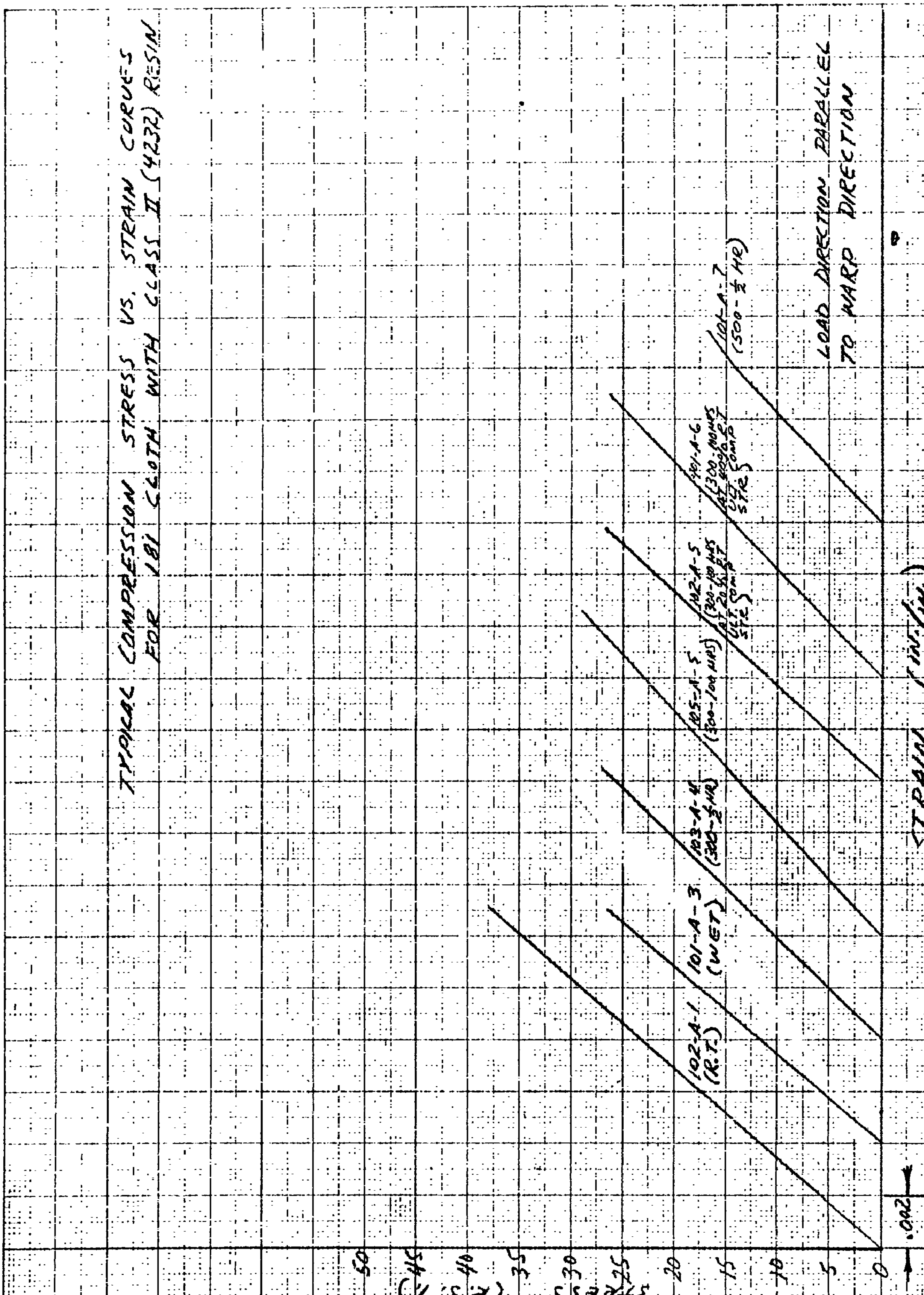

TYPICAL COMPRESSION STRESS VS. STRAIN CURVES
FOR 181 CLOTH WITH CLASS II (4232) RESIN
LOAD DIRECTION PARALLEL
TO WARP DIRECTION
102-A-1 (R.T.)
101-A-3 (WET)
103-A-4 (300-½HR)
105-A-5 (300-100 HRS)
101-A-7 (500-½ HR)
STRESS (K.S.I.)
0
5
10
15
20
25
30
35
40
45
50
.002
STRAIN (IN./IN.)

FIGURE 13

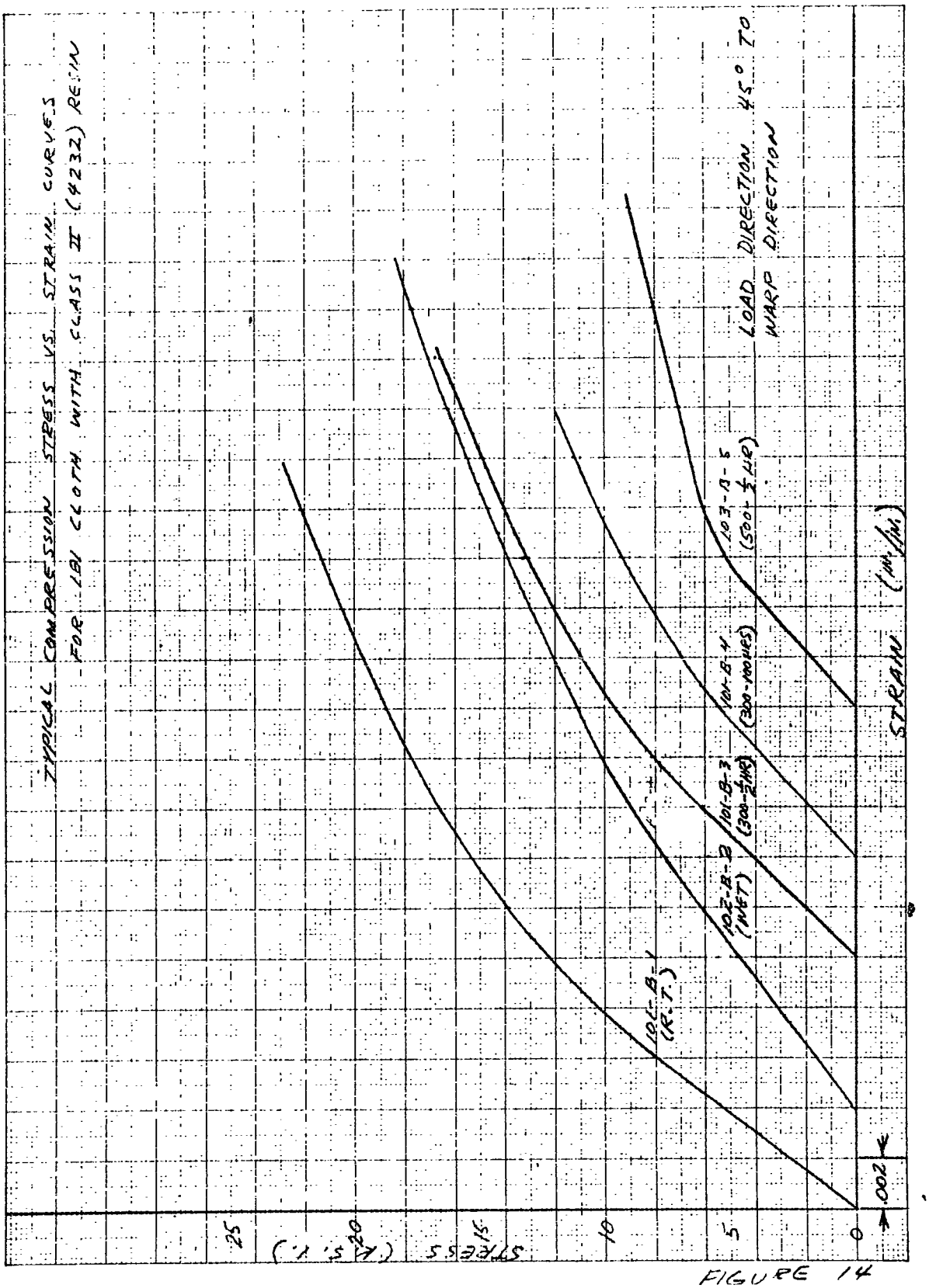

TYPICAL COMPRESSION STRESS VS. STRAIN CURVES
FOR 181 CLOTH WITH CLASS II (4232) RESIN
LOAD DIRECTION 45° TO WARP DIRECTION
STRESS (psi)
STRAIN (in/in)
0
5
10
25
.002
103-B-5 (500+ ± HR)
101-B-4 (300-hours)
102-B-3 (300-2HR)
102-B-2 (WET)
102-B-1 (R.T.)

FIGURE 14

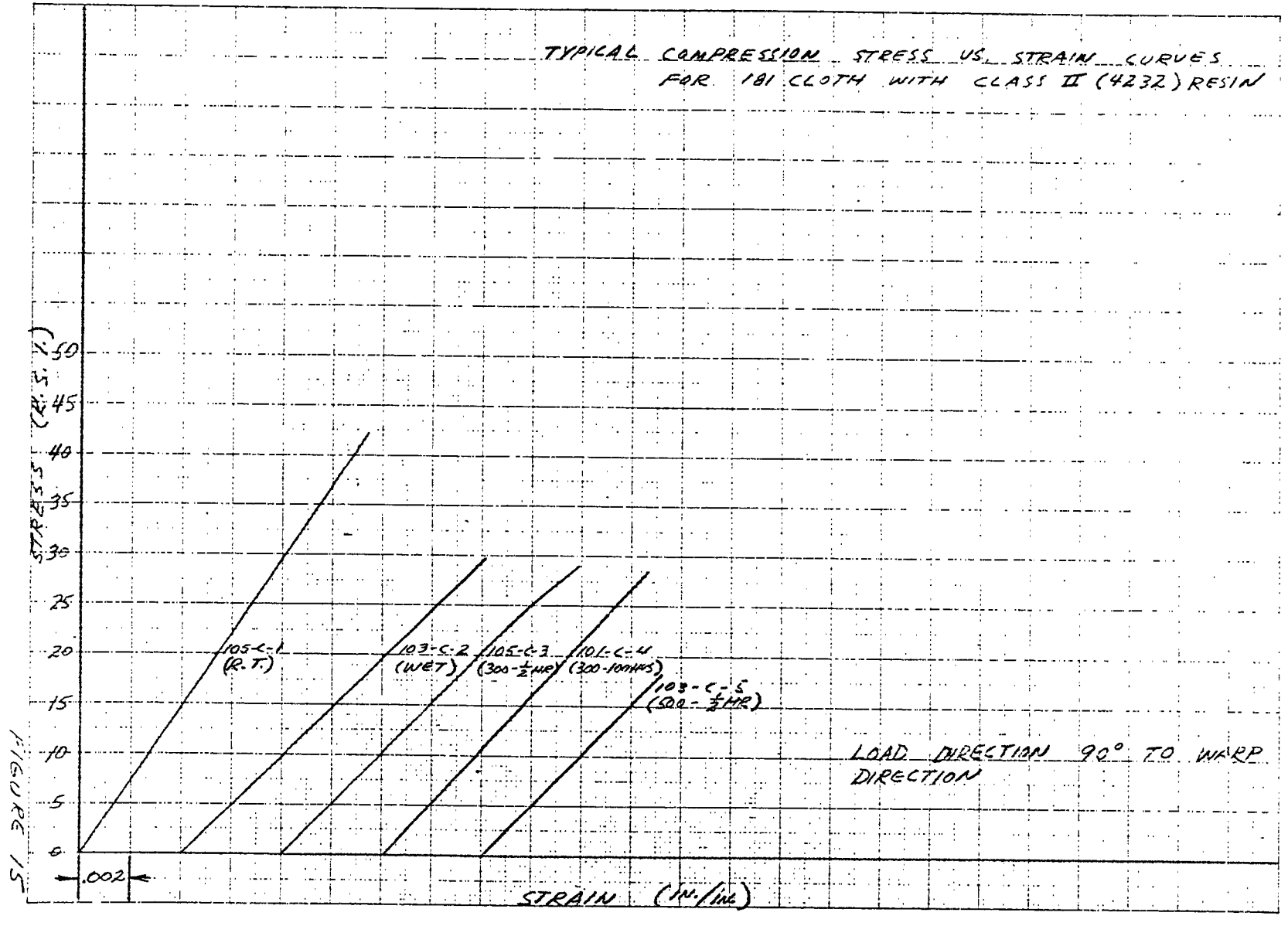

TYPICAL COMPRESSION STRESS VS. STRAIN CURVES
FOR 181 CLOTH WITH CLASS II (4232) RESIN
STRESS (K.S.I.)
50
45
40
35
30
25
20
15
10
5
0
.002
STRAIN (IN./INCH)
105-C-1
(R.T.)
103-C-2
(WET)
105-C-3
(300-½ HR)
101-C-4
(300-100 HRS)
103-C-5
(500-½ HR)
LOAD DIRECTION 90° TO WARP DIRECTION

FIGURE 15

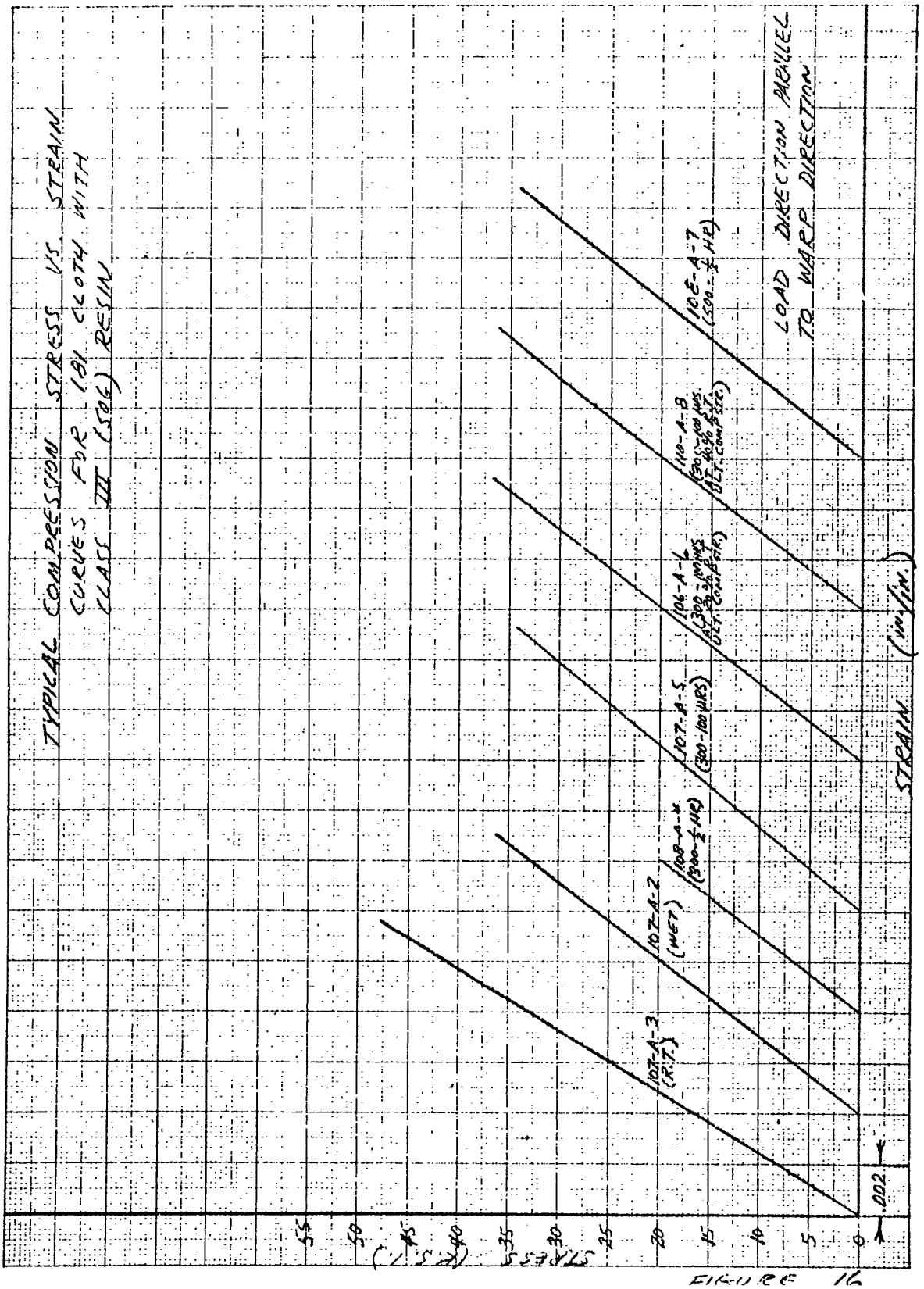

TYPICAL COMPRESSION STRESS VS. STRAIN
CURVES FOR 181 CLOTH WITH
CLASS III (S2/6) RESIN
LOAD DIRECTION PARALLEL
TO WARP DIRECTION
STRESS (ksi)
STRAIN (in/in.)
0
5
10
15
20
25
30
35
40
45
50
55
.002
107-A-3 (R.T.)
107-A-2 (WET)
108-A-4 (300°F WET)
107-A-5 (300°F WET)
106-A-6 (300°F WET)
110-A-8 (300°F WET)
110-E-A-7 (300°F WET)

FIGURE 16

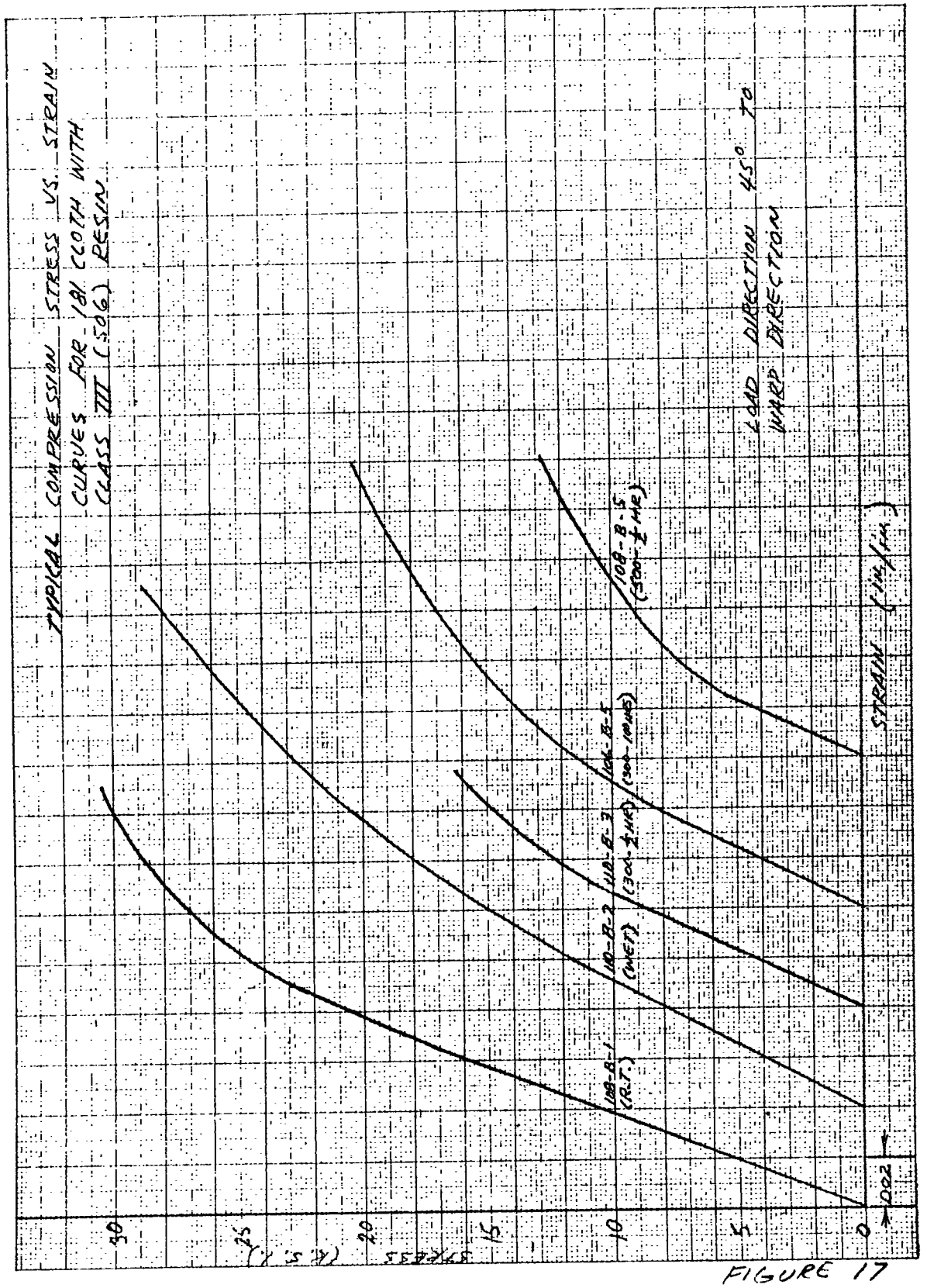

TYPICAL COMPRESSION STRESS VS. STRAIN CURVES FOR 181 CLOTH WITH CLASS III (5106) RESIN
LOAD DIRECTION 45° TO WARP DIRECTION
STRESS (1000 PSI)
STRAIN (IN/IN)
0
5
10
15
20
25
30
.002
108-B-1 (R.T.)
110-B-2 (WET)
110-B-3 (304-1 HR)
104-B-5 (300-1 HR)
108-B-5 (300-1 HR)

FIGURE 17

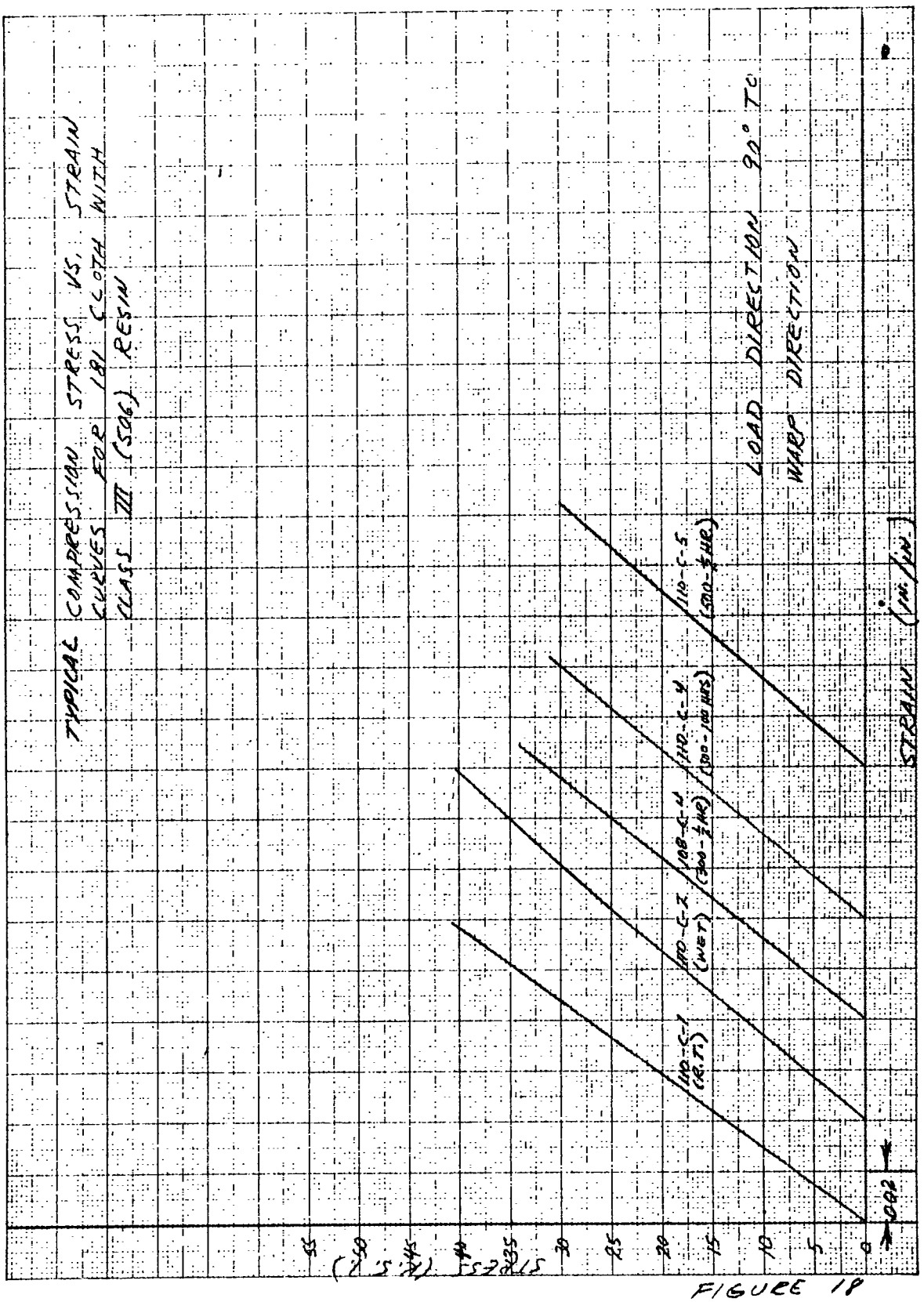

TYPICAL COMPRESSION STRESS VS. STRAIN
CURVES FOR 181 CLOTH WITH
CLASS III (S96) RESIN
LOAD DIRECTION 20° TO
WARP DIRECTION
110-C-1 (RT)
110-C-2 (WET)
108-C-4 (300-½ HR)
110-C-4 (100 HRS)
110-C-5 (300-½ HR)
STRAIN (in./in.)
.002

FIGURE 18

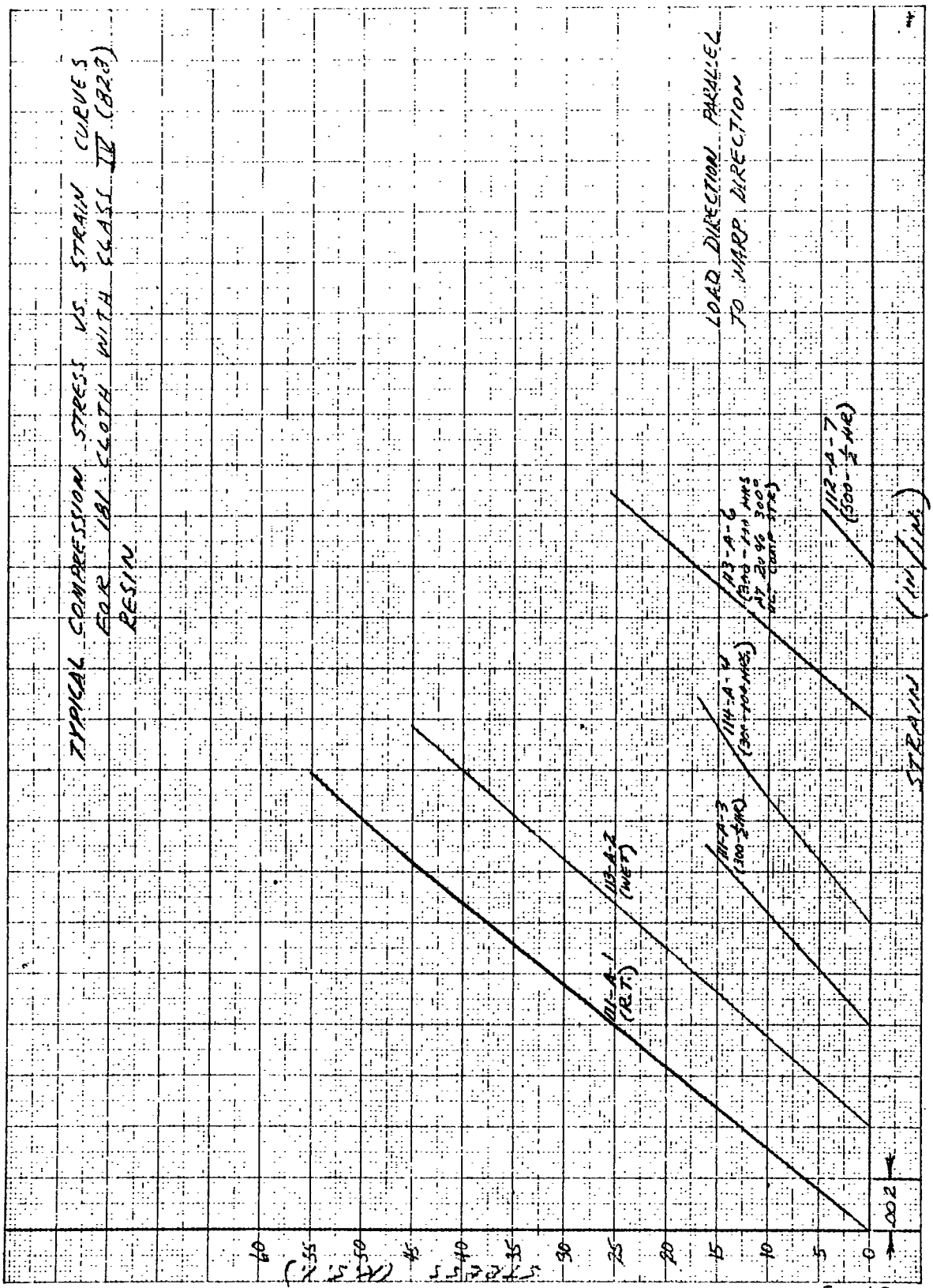

TYPICAL COMPRESSION STRESS VS. STRAIN CURVES FOR 181 E-GLOTH WITH E-GLASS III (8229) RESIN
LOAD DIRECTION PARALLEL TO WARP DIRECTION
STRESS (KSI)
STRAIN (IN/IN)
111-A-1 (RT)
115-A-2 (WET)
113-A-3 (300°F)
114-A-2 (300°F 100 HRS)
123-A-6 (300°F 200 HRS AT 20 PSI 300° DEC. CURE STR.)
112-A-7 (500°F WET)

FIGURE 19

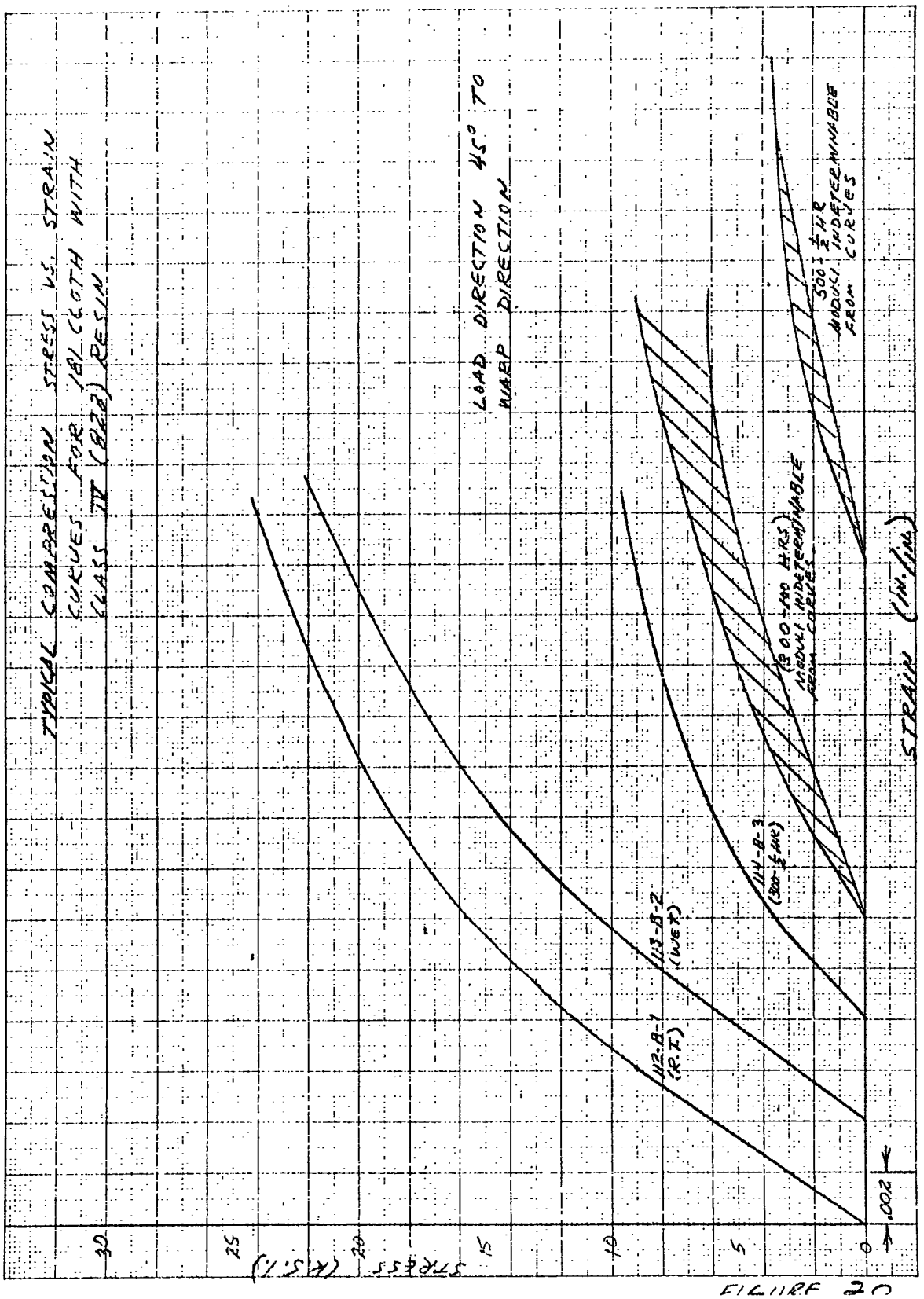

TYPICAL COMPARISON STRESS VS STRAIN CURVES FOR 181 CLOTH WITH GLASS 77 (BASE) RESIN
LOAD DIRECTION 45° TO WARP DIRECTION
STRESS (KSI)
STRAIN (IN./IN.)
0
5
10
15
20
25
30
.002
112-B-1 (R.T.)
113-B-2 (WET)
114-B-3 (300°F WET)
(300 HRS) MODULI INDETERMINABLE FROM CURVES
300 ± 1/2 HR MODULI INDETERMINABLE FROM CURVES

FIGURE 20

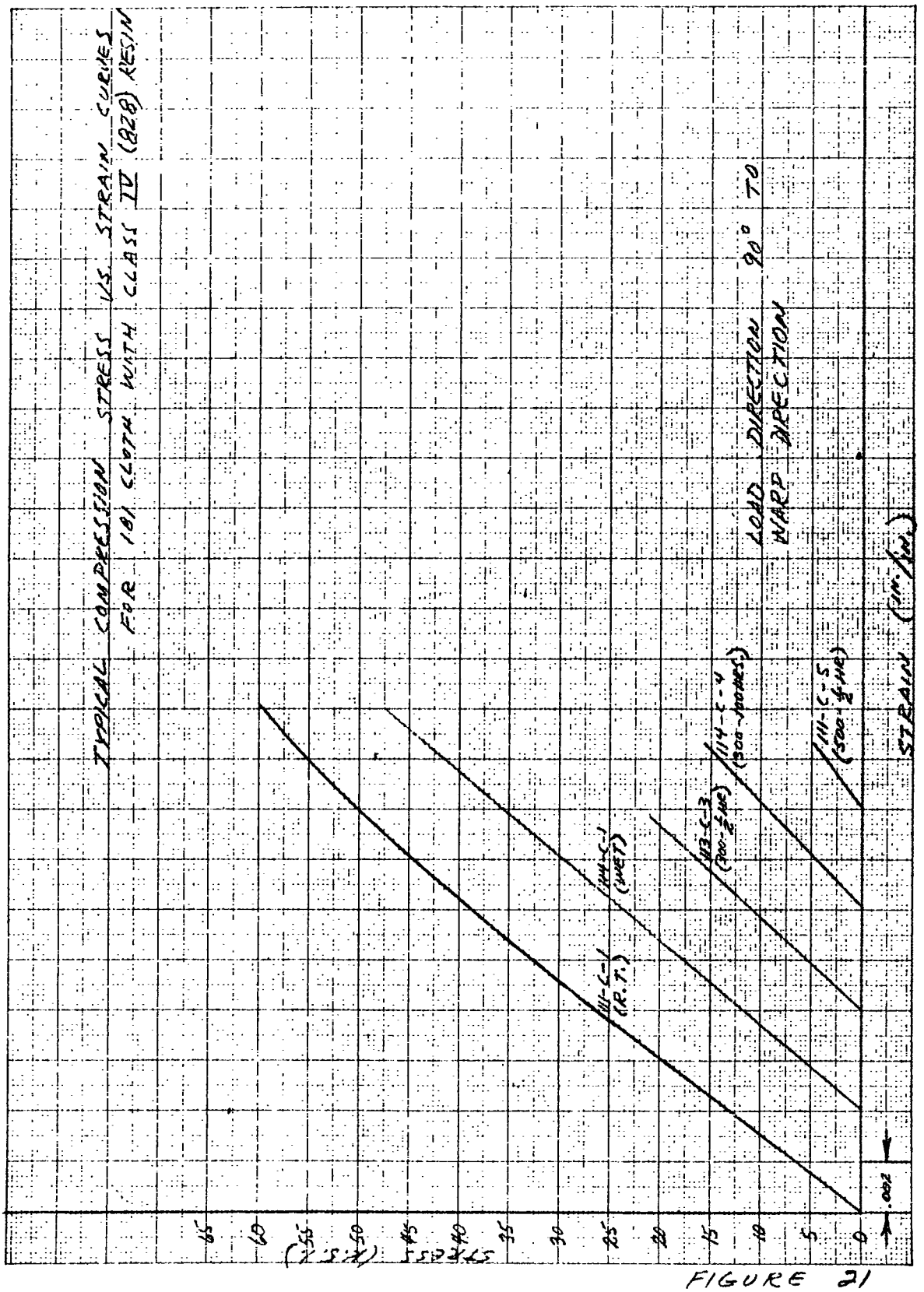

TYPICAL COMPRESSION STRESS VS. STRAIN CURVES
FOR 181 CLOTH WITH CLASS IV (828) RESIN
LOAD DIRECTION 90° TO WARP DIRECTION
STRESS (psi x 10³)
STRAIN (in./in.)
111-C-1 (R.T.)
111-C-1 (wet)
113-C-3 (500-hours)
114-C-4 (500-hours)
111-C-5 (500-hours)

FIGURE 21

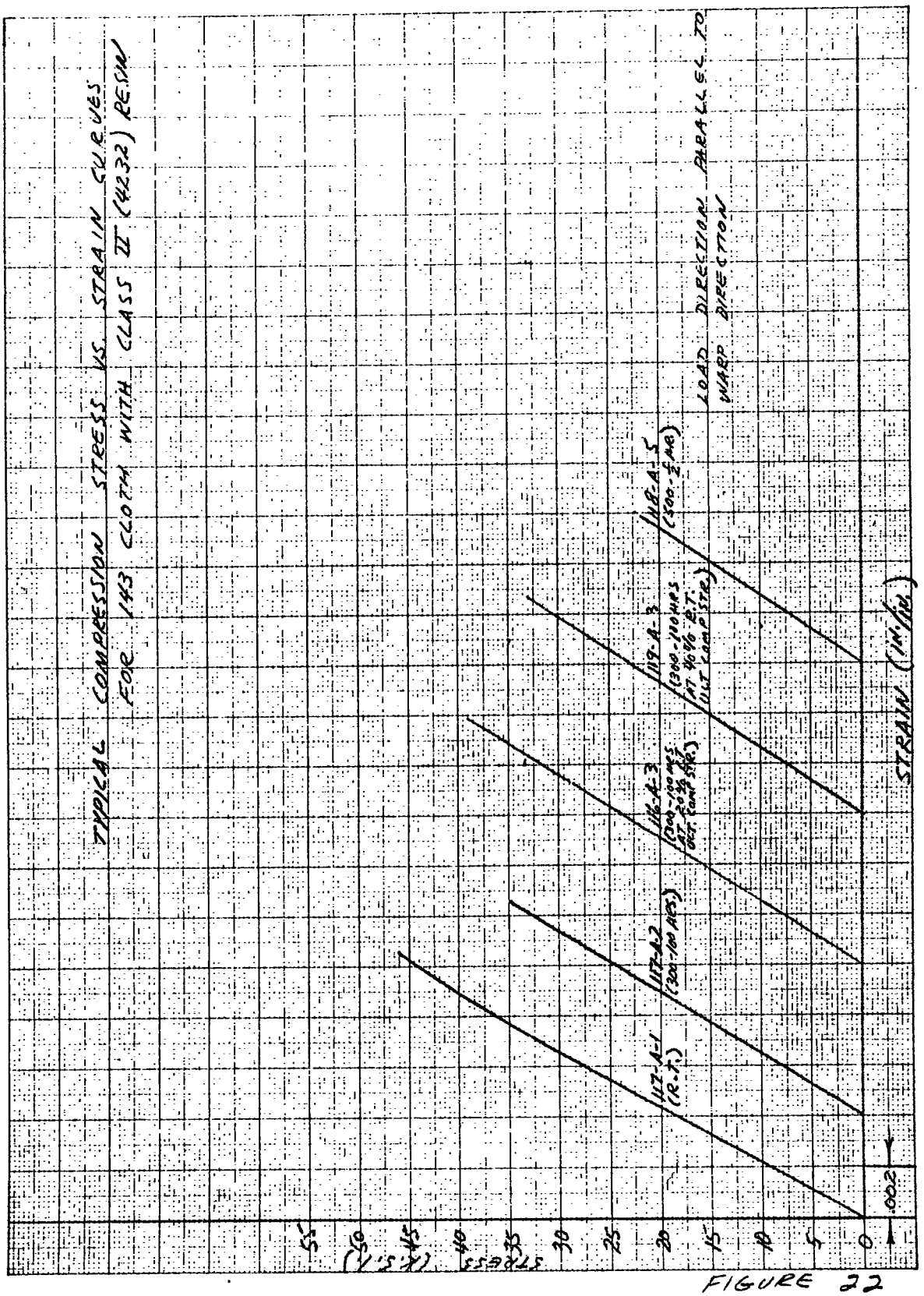

TYPICAL COMPRESSION STRESS VS. STRAIN CURVES
FOR 143 CLOTH WITH CLASS II (4232) RESIN
LOAD DIRECTION PARALLEL TO
WARP DIRECTION
STRESS (KSI)
STRAIN (IN/IN)
55
50
45
40
35
30
25
20
15
10
5
0
.002
117-A-1 (R.T.)
117-A-2 (300-100 MPS)
116-A-3 (200-100 MPS AT 250°F AFT. 240 HRS.)
119-A-3 (300-110 MPS AT 400°F. AFT. 240 HRS. WET COMPOSITE)
118-A-5 (300-2 MPS)

FIGURE 22

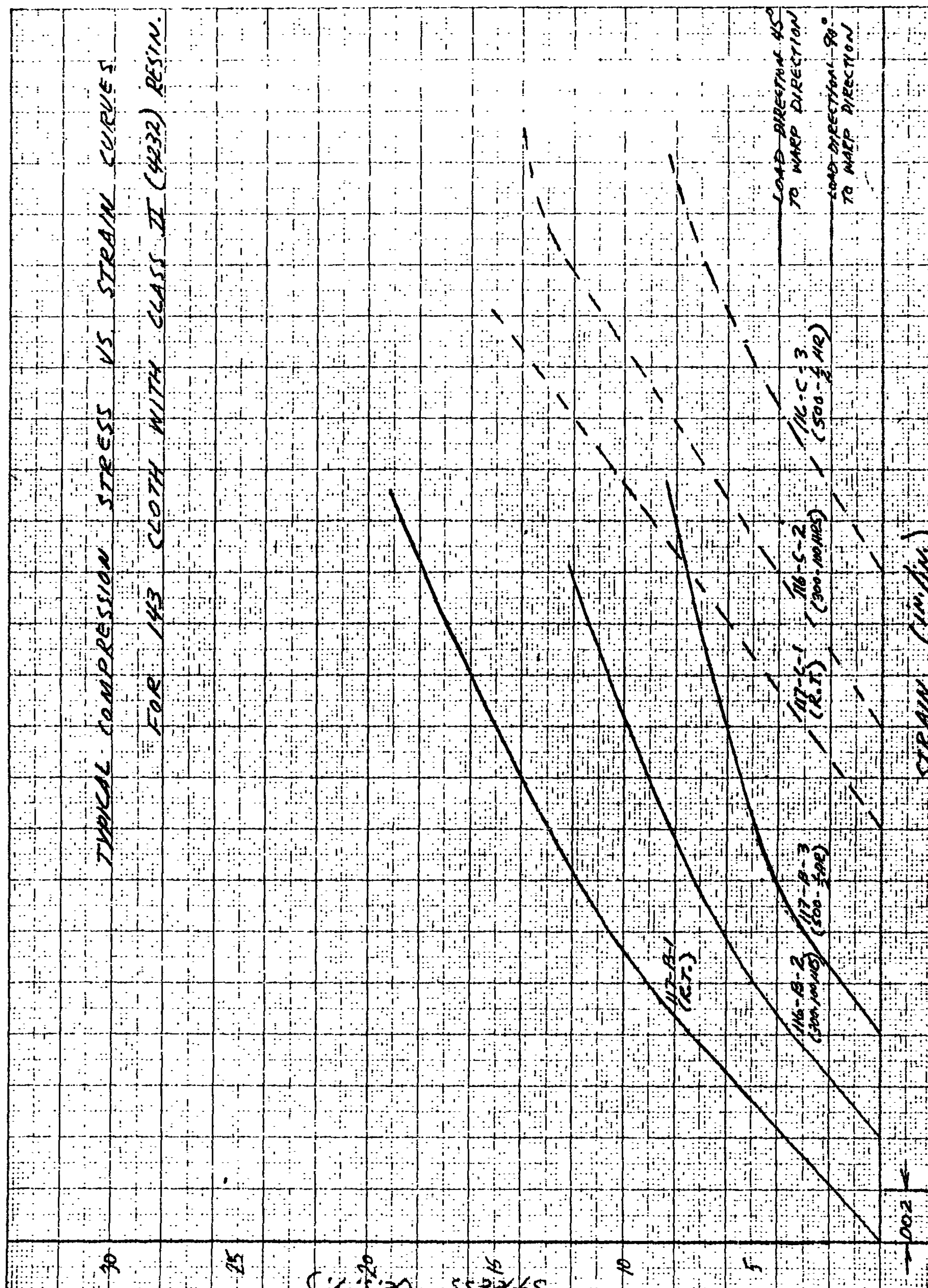

TYPICAL COMPRESSION STRESS VS STRAIN CURVES
FOR 143 CLOTH WITH CLASS II (4232) RESIN.
LOAD DIRECTION 45° TO WARP DIRECTION
LOAD DIRECTION 90° TO WARP DIRECTION
117-B-1 (R.T.)
116-B-2 (300,100 HRS)
117-B-3 (500-½HR)
117-C-1 (R.T.)
116-C-2 (300,100 HRS)
116-C-3 (500-½ HR)
STRAIN (IN/IN.)
.002
STRESS
30
25
20
15
10
5

FIGURE 23

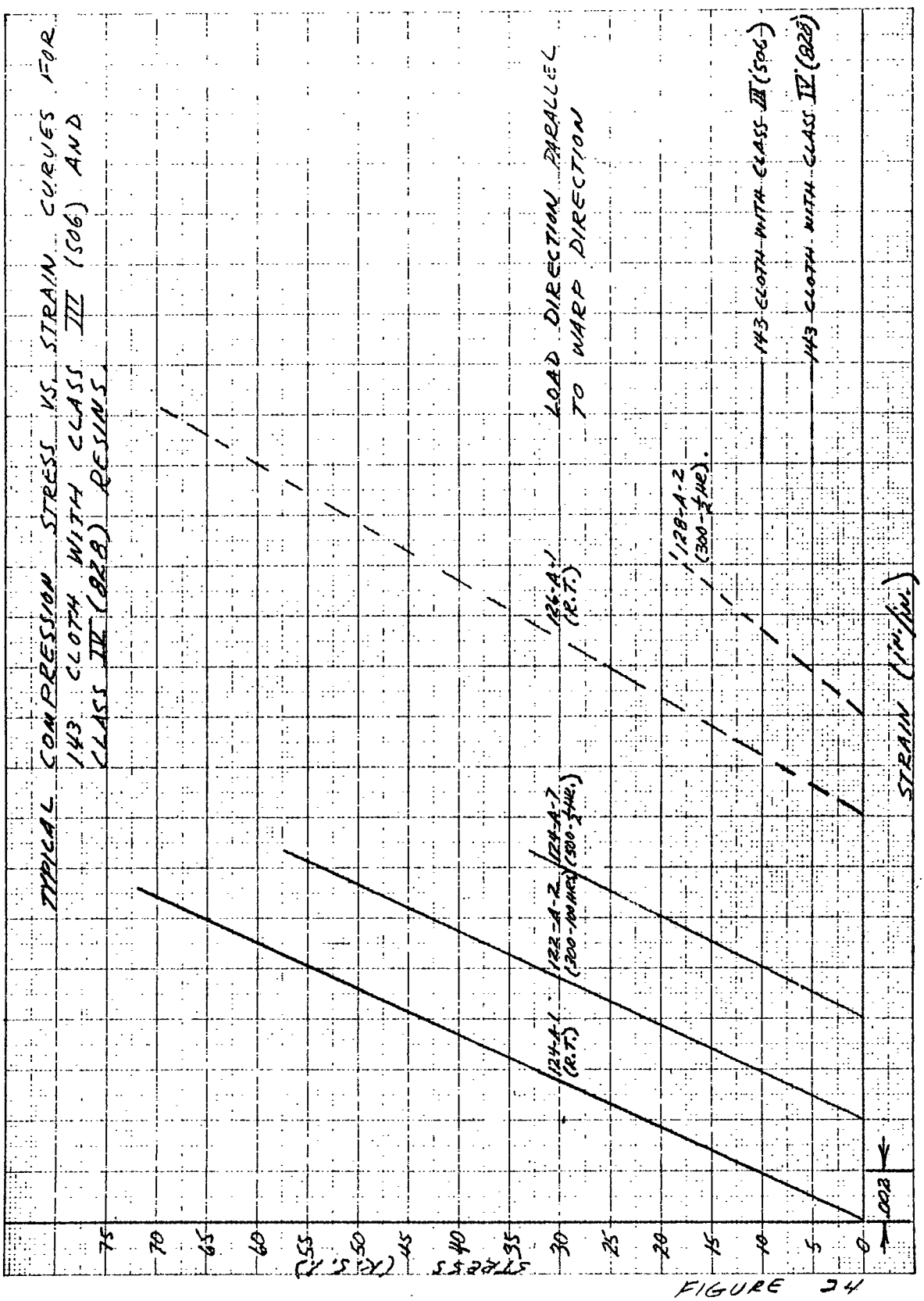

TYPICAL COMPRESSION STRESS VS. STRAIN CURVES FOR 143 CLOTH WITH CLASS III (506) AND CLASS IV (828) RESINS
STRESS (KSI)
STRAIN (in./in.)
LOAD DIRECTION PARALLEL TO WARP DIRECTION
124-A-1 (R.T.)
122-A-2, 124-A-2 (300-400 HRS) (300-$\frac{1}{4}$HR.)
126-A-1 (R.T.)
128-A-2 (300-$\frac{1}{4}$HR.)
143 CLOTH WITH CLASS III (506)
143 CLOTH WITH CLASS IV (828)
.002

FIGURE 34

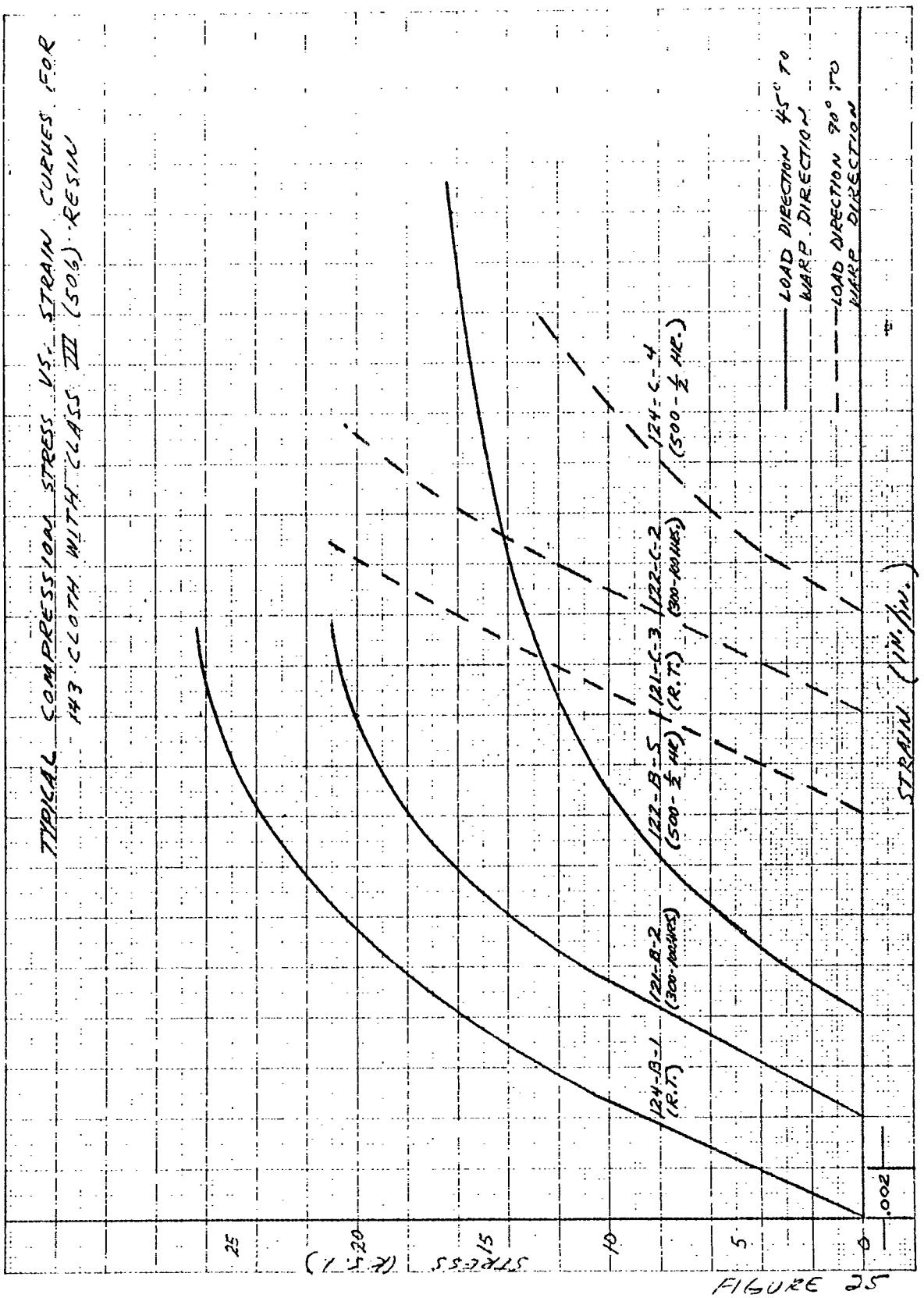

TYPICAL COMPRESSION STRESS VS. STRAIN CURVES FOR
143 CLOTH WITH CLASS III (50%) RESIN
LOAD DIRECTION 45° TO
WARP DIRECTION
LOAD DIRECTION 90° TO
WARP DIRECTION
124-B-1
(R.T.)
121-B-2
(300-Knotted)
122-B-5
(500-½ HR)
121-C-3
(R.T.)
122-C-2
(300-100 HRS.)
124-C-4
(500-½ HR.)
STRESS (K.S.I.)
STRAIN (in./in.)
25
20
15
10
5
0
.002

FIGURE 25

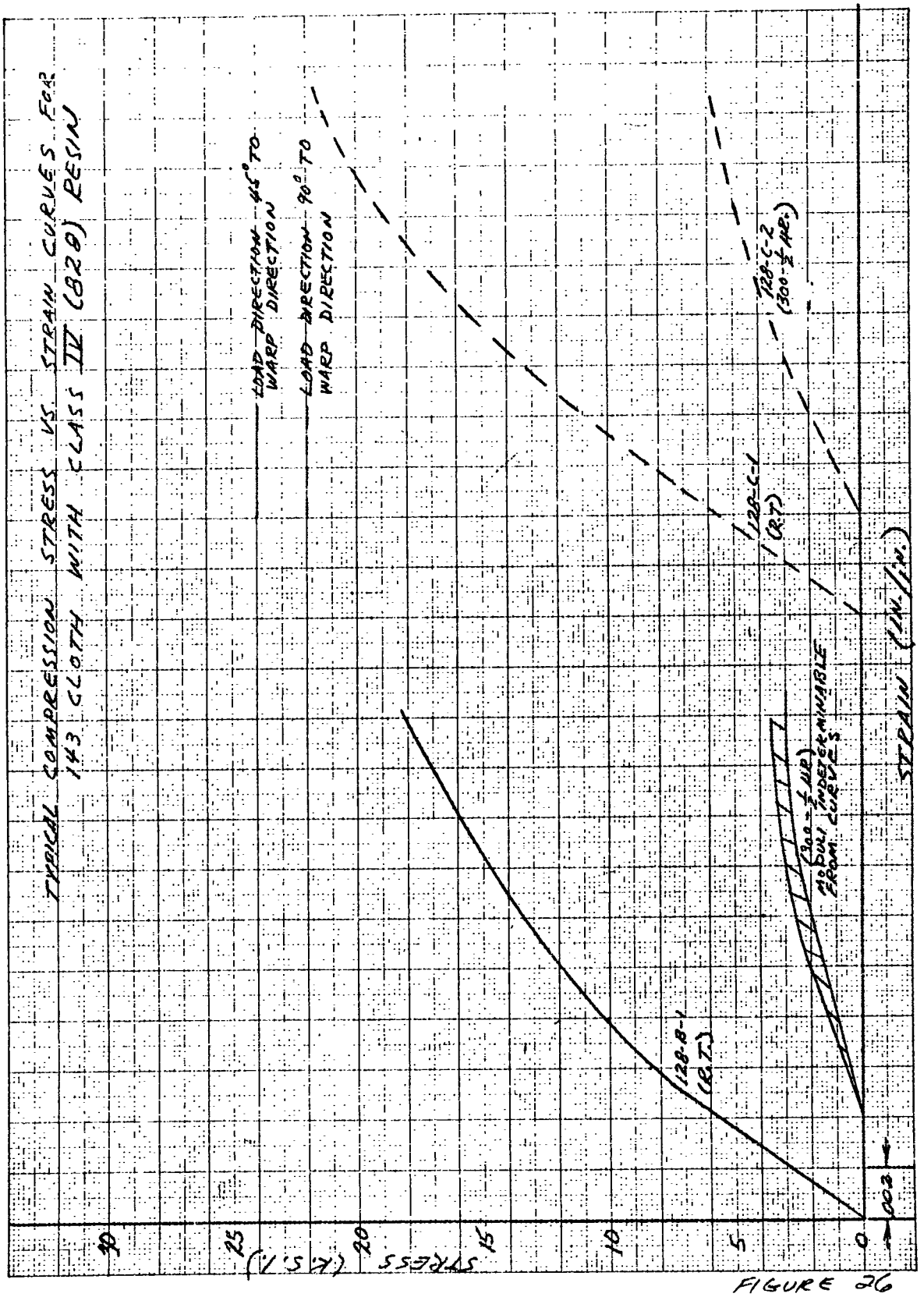

TYPICAL COMPRESSION STRESS VS. STRAIN CURVES FOR
143 CLOTH WITH CLASS IV (020) RESIN
LOAD DIRECTION 45° TO WARP DIRECTION
LOAD DIRECTION 90° TO WARP DIRECTION
STRESS (K.S.I.)
STRAIN (IN./IN.)
128-B-1 (R.T.)
128-C-1 (R.T.)
128-C-2 (300-½ HR.)
0
5
10
15
20
25
.002

FIGURE 26

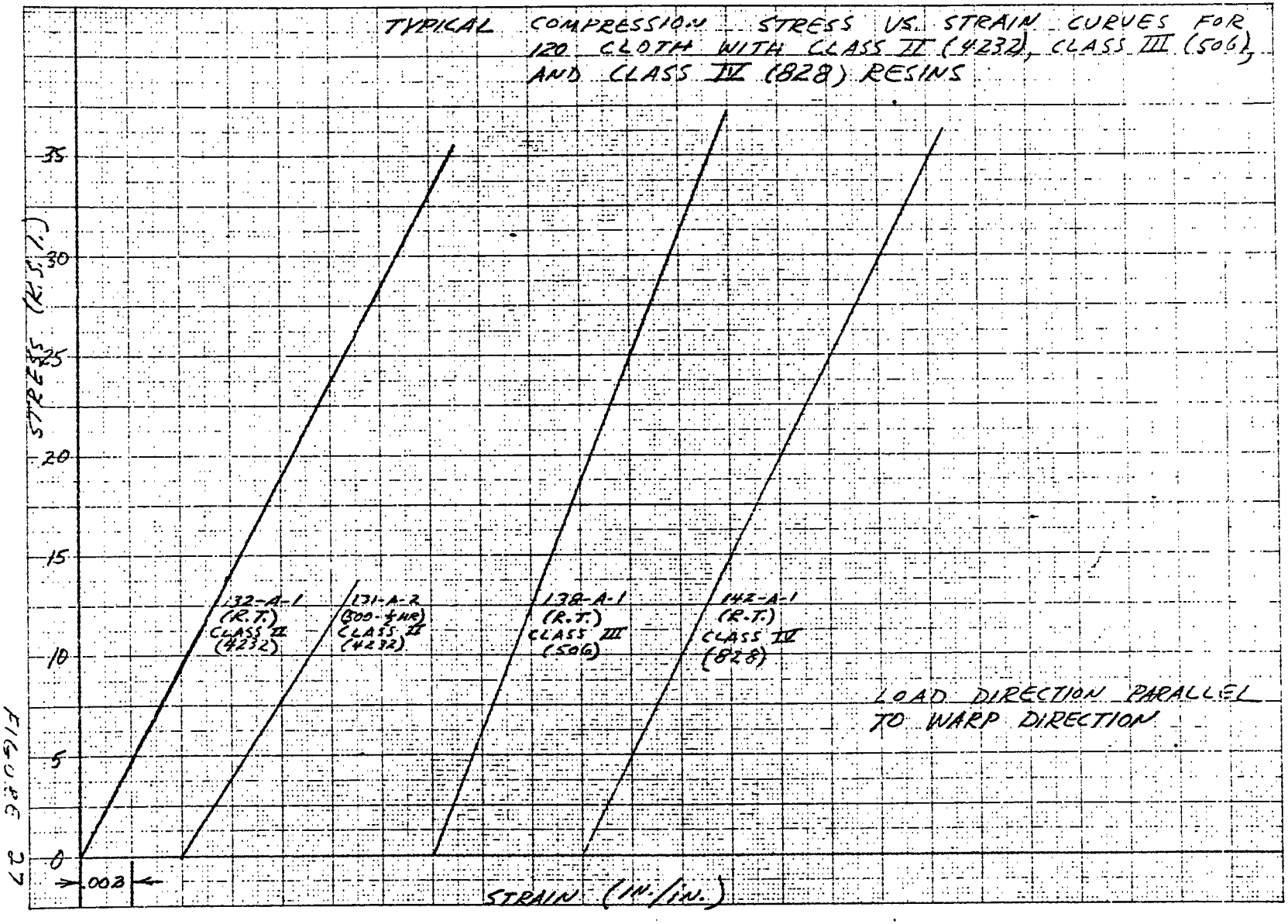

TYPICAL COMPRESSION STRESS VS. STRAIN CURVES FOR 120 CLOTH WITH CLASS II (4232), CLASS III (506), AND CLASS IV (828) RESINS
STRESS (K.S.I.)
35
30
25
20
15
10
5
0
.002
STRAIN (IN./IN.)
132-A-1 (R.T.) CLASS II (4232)
131-A-2 (300-½HR) CLASS II (4232)
138-A-1 (R.T.) CLASS III (506)
142-A-1 (R.T.) CLASS IV (828)
LOAD DIRECTION PARALLEL TO WARP DIRECTION

FIGURE 27

TYPICAL COMPRESSION STRESS VS. STRAIN CURVES FOR 183 CLOTH WITH CLASS II (4232), CLASS III (584) AND CLASS IV (820) RESINS
STRESS (KSI)
STRAIN (IN./IN.)
LOAD DIRECTION PARALLEL TO WARP DIRECTION
40
35
30
25
20
15
10
5
0
.002
181-A-1 (R.T.) CLASS II (4232)
182-A-1 (R.T.) CLASS III (584)
182-A-1 (R.T.) CLASS IV (820)

FIGURE 28

CONVAIR
A DIVISION OF GENERAL DYNAMICS CORPORATION
(FORT WORTH)

TABLE I

COMPRESSION TEST CONDITIONS FOR VARIOUS GLASS FABRIC AND RESIN COMBINATIONS

ANGLE OF LOADING (1)	TREATMENT	GLASS FABRIC & RESIN COMBINATION: 181-428-500	181-928-500	143-556-428	143-557-428	120-428-500	120-428-500	183-428-500	183-428-500	183-428-500
0	R.T.	X	X	X	X	X	X	X	X	X
45	R.T.		X	X	X	X	X	X	X	X
90	R.T.		X	X	X	X	X	X	X	X
0	R.T. WET (2)		X	X	X					
45	R.T. WET (2)		X	X	X					
90	R.T. WET (2)		X	X	X					
0	300° 1/2 HR AT 300°	X	X	X	X	X	X	X	X	X
45	300° 1/2 HR AT 300°	X	X	X	X	X	X	X	X	X
90	300° 1/2 HR AT 300°	X	X	X	X	X	X	X	X	X
0	300° 100 HRS. AT 300°	X	X	X	X	X	X	X	X	X
45	300° 100 HRS. AT 300°	X	X	X	X	X	X	X	X	X
90	300° 100 HRS. AT 300°	X	X	X	X	X	X	X	X	X
0	300° STRESSED AT 200 PSI TO 300° COMP. STR. VALUE	X	X		X					
0	300° STRESSED AT 200 PSI TO 300° COMP. STR. VALUE	X	X		X					
0	300° STRESSED AT 200 PSI TO 300° COMP. STR. VALUE	X	X		X					
0	500° 1/2 HR AT 500°	X	X	X	X	X	X	X	X	X
45	500° 1/2 HR AT 500°	X	X	X	X	X	X	X	X	X
90	500° 1/2 HR AT 500°	X	X	X	X	X	X	X	X	X

(1) ANGLE BETWEEN LOAD AND WARP DIRECTION OF SPECIMEN
(2) SOAKED IN BOILING DISTILLED WATER FOR 3 HRS. AND TESTED AT ROOM TEMPERATURES

CONVAIR — FORT WORTH

TABULATION SHEET

TABLE II COMPRESSION TESTS

181 CLOTH WITH CLASS II (4232) RESIN

SPECIMEN NO.	(1) ANGLE OF LOADING (DEGREES)	TEST TEMP. (F)	CONDITION	ULTIMATE COMP STR. (KSI)	E_c / 10^6 (PSI)	LOCATION OF FAILURE	JIG AND STRAIN MEASUREMENT
101-A-1	0	R.T.		36.8	2.90	REDUCED SECTION	4
102-A-1	↓	↓	↓	38.0	2.90	(3) END	2
103-A-1	↓	↓	↓	43.5	2.95	REDUCED SECTION	4
105-A-1	↓	↓	↓	43.4	3.35	" "	4
AVERAGE				41.2	3.03		
101-B-1	45	↓	↓	22.7	1.34	REDUCED SECTION	4
102-B-1	↓	↓	↓	22.3	1.13	" "	1
103-B-1	↓	↓	↓	26.4	1.86	" "	4
AVERAGE				23.8	1.44		
101-C-1	90	↓	↓	45.2	3.80	REDUCED SECTION	4
102-C-1	↓	↓	↓	46.3	3.74	" "	4
103-C-1	↓	↓	↓	40.0	—	" "	4
105-C-1	↓	↓	↓	42.5	3.74	" "	4
AVERAGE				43.5	3.76		
101-A-3	0	↓	(2) WET	26.9	2.95	REDUCED SECTION	2
102-A-3	↓	↓	↓	29.8	2.24	" "	2
103-A-3	↓	↓	↓	29.8	2.15	" "	2
105-A-3	↓	↓	↓	32.3	3.95	" "	2
AVERAGE				29.7	2.82		

JIGS AND STRAIN MEASUREMENT.

1 - CONVAIR BUILT LEAF TYPE

2 - LP406-B WITH B-3M EXTENSOMETER

3 - LP406-B WITH PC-7M COMPRESSOMETER

4 - LP406-B WITH CONVAIR BUILT EXTENSION ARMS.

(1) - ANGLE BETWEEN LOAD AND WARP DIRECTION OF SPECIMEN

(2) - SOAKED IN BOILING DISTILLED WATER FOR 3 HRS. AND IMMEDIATELY TESTED AT ROOM TEMPERATURE

(3) - ULTIMATE COMP. STR. VALUE NOT INCLUDED IN AVERAGE

CONVAIR — FORT WORTH

TABULATION SHEET

TABLE II CONTD. COMPRESSION TESTS

181 CLOTH WITH CLASS II (4232) RESIN

SPECIMEN NO.	(1) ANGLE OF LOADING	TEST TEMP.	CONDITION	ULTIMATE COMP. STR.	E_c / 10^6	LOCATION OF FAILURE		JIG AND STRAIN MEASUREMENT
	(DEGREES)	(F)		(KSI)	(PSI)			
100-B-2	45	R.T.	(2) WET	11.1	.67	DELAMINATION IN REDUCED	SECTION	2
101-B-2				17.6	.72	REDUCED	SECTION	2
102-B-2				19.6	.78	"	"	2
103-B-2				18.3	.98	"	"	2
AVERAGE				16.7	.79			
101-C-2	90			26.9	2.37	REDUCED	SECTION	2
102-C-2				34.7	2.11	"	"	2
103-C-2				29.7	2.44	"	"	2
105-C-2				31.3	2.15	"	"	2
AVERAGE				30.1	2.27			
101-A-4	0	300	SOAKED AT 300F	29.0	2.57	REDUCED	SECTION	2
102-A-4			FOR 1/2 HR.	29.0	2.40	"	"	2
103-A-4				27.1	2.92	"	"	2
105-A-4				28.9	2.54	"	"	2
AVERAGE				28.5	2.61			
100-B-3	45			13.5	1.07	DELAMINATION IN REDUCED	SECTION	2
101-B-3				18.9	1.01	REDUCED	SECTION	2
102-B-3				19.0	.96	"	"	2
103-B-3				19.4	1.12	"	"	2
AVERAGE				17.7	1.04			
101-C-3	90			28.4	2.76	REDUCED	SECTION	2
102-C-3				25.1	2.87	"	"	2
103-C-3				28.5	2.64	"	"	2
105-C-3				22.9	2.59	"	"	2
AVERAGE				27.7	2.72			

CONVAIR — FORT WORTH
TABULATION SHEET

TABLE II CONTD. COMPRESSION TESTS
181 CLOTH WITH CLASS II (4232) RESIN

SPECIMEN NO.	(1) ANGLE OF LOADING (DEGREES)	TEST TEMP. (F)	CONDITION	ULTIMATE COMP. STR. (KSI)	E_c / 10^6 (PSI)	LOCATION OF FAILURE		JIG AND STRAIN MEASUREMENT
101-A-6	0	300	SOAKED AT 300F	18.3	2.91	(3) END		2
102-A-5			FOR 100 HRS.	31.3	2.25	REDUCED	SECTION	2
103-A-5				28.3	2.59	"	"	2
105-A-5				29.7	2.32	"	"	2
AVERAGE				29.8	2.52			
100-B-4	45			13.4	.92	DELAMINATIONS REDUCED	IN SECTION	2
101-B-4				17.1	1.30	DITTO	ABOVE	2
102-B-4				18.9	1.29	DITTO	ABOVE	2
103-B-4				16.6	.94	REDUCED	SECTION	2
AVERAGE				16.5	1.11			
101-C-4	90			30.3	2.58	REDUCED	SECTION	2
102-C-4				31.7	2.43	"	"	2
103-C-4				25.5	2.39	"	"	2
105-C-4				20.2	2.63	(3) END		2
AVERAGE				29.2	2.51			
101-A-5	0		SOAKED AT 300F FOR	26.5	3.30	REDUCED	SECTION	3
102-A-5			100 HRS. WHILE STRESSED	28.5	2.58	"	"	3
103-A-6			TO 20% OF ROOM TEMP.	29.7	3.07	"	"	3
105-A-6			ULT. COMP. STR. VALUE.	30.9	3.34	"	"	1
AVERAGE				28.9	3.07			
101-A-6	0		SOAKED AT 300F FOR	28.1	2.37	REDUCED	SECTION	3
102-A-6			100 HRS. WHILE STRESSED	30.4	2.40	"	"	3
103-A-3			TO 40% OF ROOM TEMP.	28.0	2.70	"	"	3
AVERAGE			ULT. COMP. STR. VALUE	28.8	2.49			

CONVAIR — FORT WORTH

TABULATION SHEET

TABLE II CONTD. COMPRESSION TESTS

181 CLOTH WITH CLASS II (4232) RESIN

SPECIMEN NO.	(1) ANGLE OF LOADING (DEGREES)	TEST TEMP. (F)	CONDITION	ULTIMATE COMP STR. (KSI)	E_c / 10^6 (PSI)	LOCATION OF FAILURE		JIG AND STRAIN MEASUREMENT
101-A-7	0	500	SOAKED AT 500F	20.9	2.34	REDUCED	SECTION	1
102-A-7			FOR ½ HR.	17.6	2.48	"	"	1
103-A-7				18.9	2.45	"	"	1
105-A-7				18.0	2.45	"	"	1
AVERAGE				18.9	2.43			
100-B-1	45			8.6	.62	REDUCED	SECTION	1
101-B-5				11.3	.90	"	"	1
102-B-5				12.8	.91	"	"	1
103-B-5				13.2	.89	"	"	1
AVERAGE				11.5	.83			
101-C-5	90			23.3	2.63	REDUCED	SECTION	1
102-C-5				22.1	2.84	"	"	1
103-C-5				19.6	2.54	"	"	1
105-C-5				19.2	2.62	"	"	1
AVERAGE				20.8	2.66			

CONVAIR — FORT WORTH

TABULATION SHEET

TABLE III COMPRESSION TESTS

181 CLOTH WITH CLASS III (506) RESIN

SPECIMEN NO.	(1) ANGLE OF LOADING (DEGREES)	TEST TEMP. (F)	CONDITION	ULTIMATE COMP STR. (KSI)	E_c @ 10% (PSI)	LOCATION OF FAILURE		JIG AND STRAIN MEASUREMENT
106-A-3	0	R.T.		53.6	4.11	(3) END		2
107-A-3	↓	↓		53.8	4.09	REDUCED	SECTION	2
108-A-2	↓	↓		47.7	4.27	"	"	2
110-A-1	↓	↓		42.4	3.58	"	"	2
AVERAGE				48.0	3.98			
106-B-2	45	↓		32.0	2.63	REDUCED	SECTION	2
107-B-1	↓	↓		30.0	2.74	"	"	2
108-B-1	↓	↓		31.6	2.87	"	"	2
110-B-1	↓	↓		31.7	2.54	"	"	2
AVERAGE				31.3	2.57			
106-C-1	90	↓		50.6	4.21	REDUCED	SECTION	2
107-C-1	↓	↓		42.2	3.27	"	"	2
108-C-3	↓	↓		47.8	3.44	"	"	2
110-C-1	↓	↓		42.9	3.49	"	"	2
AVERAGE				45.9	3.60			
106-A-2	0	↓	(2) WET	43.7	3.39	REDUCED	SECTION	2
107-A-2	↓	↓	↓	36.0	3.31	"	"	2
109-A-1	↓	↓	↓	45.7	3.71	(3) END		2
110-A-2	↓	↓	↓	41.9	2.75	REDUCED	SECTION	2
AVERAGE				40.6	3.29			

JIGS AND STRAIN MEASUREMENT

1 - CONVAIR BUILT LEAF TYPE

2 - LP406-B WITH B-3M EXTENSOMETER

3 - LP406-B WITH PC-7M COMPRESSOMETER

(1) ANGLE BETWEEN LOAD AND WARP DIRECTION OF SPECIMEN

(2) SOAKED IN BOILING DISTILLED WATER FOR 3 HRS. AND IMMEADIATELY TESTED AT ROOM TEMPERATURE

(3) ULTIMATE COMP STR. VALUE NOT INCLUDED IN AVERAGE

CONVAIR — FORT WORTH

TABULATION SHEET

TABLE III CONTD. COMPRESSION TESTS

181 CLOTH WITH CLASS III (506) RESIN

SPECIMEN NO.	(1) ANGLE OF LOADING	TEST TEMP.	CONDITION	ULTIMATE COMP STR.	E_c / 10^6	LOCATION OF FAILURE		JIG AND STRAIN MEASUREMENT
	(DEGREES)	(F)		(KSI)	(PSI)			
106-B-3	45	R.T.	(2) WET	26.8	2.51	(3) END		2
107-B-2	↓	↓	↓	27.8	1.88	REDUCED	SECTION	2
108-B-2	↓	↓	↓	28.2	2.11	"	"	1
110-B-2	↓	↓	↓	29.9	1.96	"	"	2
AVERAGE				28.6	2.12			
106-C-2	90	↓	↓	26.1	2.89	(3) END		2
107-C-2	↓	↓	↓	39.5	2.85	REDUCED	SECTION	2
108-C-1	↓	↓	↓	39.1	3.21	"	"	3
110-C-2	↓	↓	↓	41.2	2.99	"	"	2
AVERAGE				39.9	2.99			
106-A-4	0	300	SOAKED AT 300F	51.1	3.99	(3) END		2
107-A-4	↓	↓	FOR 1/2 HR.	21.0	3.29	"		2
108-A-4	↓	↓	↓	45.1	3.75	"		1
110-A-3	↓	↓	↓	25.0	3.36	"		2
AVERAGE				—	3.60			
106-B-4	45	↓	↓	25.3	2.93	REDUCED	SECTION	2
107-B-3	↓	↓	↓	21.9	2.23	"	"	2
108-B-3	↓	↓	↓	25.2	2.59	"	"	2
110-B-3	↓	↓	↓	21.4	2.19	"	"	2
AVERAGE				23.5	2.49			
106-C-3	90	↓	↓	26.3	3.79	(3) END		2
107-C-3	↓	↓	↓	38.2	3.55	"		2
108-C-4	↓	↓	↓	33.4	3.10	REDUCED	SECTION	3
110-C-3	↓	↓	↓	42.2	3.42	"	"	3
AVERAGE				37.8	3.47			

CONVAIR — FORT WORTH

TABULATION SHEET

TABLE III CONTD. COMPRESSION TESTS

181 CLOTH WITH CLASS II (50%) RESIN

SPECIMEN NO.	(1) ANGLE OF LOADING (DEGREES)	TEST TEMP. (F)	CONDITION	ULTIMATE COMP STR. (KSI)	E_c (PSI)	LOCATION OF FAILURE		JIG AND STRAIN MEASUREMENT
106-A-5	0	300	SOAKED AT 300F	33.7	4.18	REDUCED	SECTION	2
107-A-5	↓	↓	FOR 100 HRS.	38.7	3.06	"	"	2
108-A-5	↓	↓	↓	24.5	2.75	(3) END		2
110-A-4	↓	↓	↓	20.1	3.00	REDUCED	SECTION	2
AVERAGE				30.8	3.25			
106-B-5	45			21.3	2.07	REDUCED	SECTION	2
107-B-4	↓			19.1	1.57	"	"	3
108-B-4	↓			21.6	1.24	"	"	2
110-B-4	↓			20.7	1.69	"	"	2
AVERAGE				20.7	1.64			
106-C-4	90			31.0	3.30	REDUCED	SECTION	2
107-C-4	↓			29.7	2.86	"	"	2
108-C-5	↓	↓		30.3	—	"	"	2
110-C-4	↓	↓		32.2	3.08	"	"	2
AVERAGE				30.8	3.08			
106-A-6	0		SOAKED AT 300F FOR	36.7	3.30	REDUCED	SECTION	3
107-A-5	↓		100 HRS WHILE STRESSED	35.7	—	"	"	1
110-A-5	↓		TO 20% OF ROOM TEMP.	34.4	3.04	(3) END		3
AVERAGE			ULT. COMP. STR. VALUE	36.2	3.17			
106-A-1	0		SOAKED AT 300F FOR	28.2	—	REDUCED	SECTION	1
107-A-6	↓		100 HRS. WHILE STRESSED	36.2	3.31	"	"	1
110-A-8	↓	↓	TO 40% OF ROOM TEMP	36.4	3.31	"	"	1
AVERAGE	↓	↓	ULT. COMP STR. VALUE	33.6	3.31			

CONVAIR — FORT WORTH

TABULATION SHEET

TABLE III CONTD. COMPRESSION TESTS

181 CLOTH WITH CLASS III (506) RESIN

SPECIMEN NO.	(1) ANGLE OF LOADING	TEST TEMP.	CONDITION	ULTIMATE COMP STR.	E_c 10^6	LOCATION OF FAILURE		JIG AND STRAIN MEASUREMENT
	(DEGREES)	(F)		(KSI)	(PSI)			
106-A-7	0	500	SOAKED AT 500F	30.9	3.35	REDUCED	SECTION	1
107-A-7			FOR ½ HR.	39.4	3.77	"	"	1
108-A-7				34.6	3.18	"	"	1
110-A-7				28.4	—	"	"	1
AVERAGE				33.3	3.43			
106-B-5	45			17.6	2.20	REDUCED	SECTION	1
107-B-5				20.1	2.42	"	"	1
108-B-5				17.7	2.17	"	"	1
110-B-5				17.7	2.34	"	"	1
AVERAGE				18.3	2.28			
106-C-5	90			33.6	—	REDUCED	SECTION	1
107-C-5				31.6	3.16	"	"	1
108-C-5				19.8	—	"	"	1
110-C-5				30.1	2.85		"	1
AVERAGE				28.8	3.01			

CONVAIR — FORT WORTH

TABULATION SHEET

TABLE IV COMPRESSION TESTS

181 CLOTH WITH CLASS IV (922) RESIN

SPECIMEN NO.	(1) ANGLE OF LOADING (DEGREES)	TEST TEMP. (F)	CONDITION	ULTIMATE COMP STR. (KSI)	E_c 10^6 (PSI)	LOCATION OF FAILURE		JIG AND STRAIN MEASUREMENT
111-A-1	0	R.T.		56.6	3.12	REDUCED	SECTION	2
112-A-1				52.1	3.25	"	"	2
113-A-1				54.5	3.26	"	"	2
114-A-1				46.3	4.27	"	"	2
AVERAGE				52.4	3.48			
111-B-1	45			26.2	1.21	DELAMINATION IN REDUCED	SECTION	2
112-B-1				25.7	1.49	DITTO	ABOVE	2
113-B-1				30.5	1.47	DITTO	ABOVE	2
114-B-1				29.4	1.62	REDUCED	SECTION	2
AVERAGE				28.0	1.45			
111-C-1	90			62.3	3.25	REDUCED	SECTION	2
112-C-1				55.0	3.15	"	"	2
113-C-1				54.0	3.22	"	"	2
114-C-1				54.6	2.72	"	"	2
AVERAGE				56.5	3.14			
111-A-2	0		(2) WET	47.9	2.61	REDUCED	SECTION	2
112-A-2				45.6	2.73	"	"	2
113-A-2				50.2	3.16	"	"	2
114-A-2				45.7	2.75	"	"	2
AVERAGE				47.4	2.84			

JIGS AND STRAIN MEASUREMENT

1 - CONVAIR BUILT LEAF TYPE

2 - LP406-B WITH B-3M EXTENSOMETER

3 - LP406-B WITH PC-7M COMPRESSOMETER

(1) ANGLE BETWEEN LOAD AND WARP DIRECTION OF SPECIMEN

(2) SOAKED IN BOILING DISTILLED WATER FOR 3 HRS. AND IMMEDIATELY TESTED AT ROOM TEMPERATURE

(3) ULTIMATE COMP. STR. VALUE NOT INCLUDED IN AVERAGE

CONVAIR — FORT WORTH

TABULATION SHEET

TABLE IV CONTD. COMPRESSION TESTS

181 CLOTH WITH CLASS IV (420) RESIN

SPECIMEN NO	(1) ANGLE OF LOADING (DEGREES)	TEST TEMP. (F)	CONDITION	ULTIMATE COMP STR. (KSI)	E_c 10^6 (PSI)	LOCATION OF FAILURE	JIG AND STRAIN MEASUREMENT
111-B-2	45	R.T.	(2) WET	26.2	1.16	DELAMINATION IN REDUCED SECTION	2
112-B-2				26.6	1.47	REDUCED SECTION	2
113-B-2				28.2	1.34	DELAMINATION IN REDUCED SECTION	2
114-B-2				24.4	1.25	REDUCED SECTION	2
AVERAGE				26.4	1.31		
111-C-2	90			52.6	3.03	REDUCED SECTION	2
112-C-2				43.0	2.77	" "	2
113-C-2				52.8	2.96	" "	2
114-C-1				47.2	2.96	" "	2
AVERAGE				48.9	2.93		
111-A-3	0	300	SOAKED AT 300F	16.1	2.32	(3) END	2
112-A-3			FOR 1/2 HR.	15.1	2.91	"	2
113-A-3				22.7	2.15	REDUCED SECTION	2
114-A-3				21.1	2.62	(3) END	2
AVERAGE				22.7	2.50		
111-B-3	45			7.7	—	DELAMINATION IN REDUCED SECTION	3
112-B-3				5.4	—	DITTO ABOVE	3
113-B-3				13.8	1.12	DITTO ABOVE	2
114-B-3				12.6	.93	DITTO ABOVE	2
AVERAGE				9.9	1.05		
111-C-3	90			14.0	2.66	(3) END	2
112-C-3				12.8	1.79	"	2
113-C-3				21.5	2.72	"	2
114-C-3				16.1	2.37	"	2
AVERAGE				—	2.39		

CONVAIR — FORT WORTH

TABULATION SHEET

TABLE IV CONTD. COMPRESSION TESTS

181 CLOTH WITH CLASS IV (828) RESIN

SPECIMEN NO.	(1) ANGLE OF LOADING (DEGREES)	TEST TEMP. (F)	CONDITION	ULTIMATE COMP STR. (KSI)	E_c / 10^6 (PSI)	LOCATION OF FAILURE	JIG AND STRAIN MEASUREMENT
111-A-4	0	300	SOAKED AT 300F	15.9	1.95	(3) END	2
112-A-4			FOR 100 HRS.	13.4	2.46	"	2
113-A-4				14.3	1.90	"	2
114-A-4				17.6	2.04	"	2
AVERAGE				—	2.09		
111-B-4	45			14.7	—	DELAMINATION IN REDUCED SECTION	3
112-B-4				6.9	—	DITTO ABOVE	2
113-B-4				11.1	—	DITTO ABOVE	2
114-B-4				13.9	—	DITTO ABOVE	3
AVERAGE				11.7	—		
111-C-4	90			26.1	2.72	REDUCED SECTION	2
112-C-4				23.1	2.40	" "	2
113-C-4				35.8	2.88	" "	2
114-C-4				15.8	2.34	DELAMINATION IN REDUCED SECTION	2
AVERAGE				25.2	2.84		
112-A-3	0		SOAKED AT 300F FOR 100 HRS. WHILE STRESSED TO 20% OF ROOM TEMP. ULT. COMP. STR. VALUE	FAILED BEFORE SPECIMEN HAD SOAKED 100 HRS.			
113-A-4				23.3	2.63	REDUCED SECTION	3
114-A-5				26.7	2.58	" "	3
111-A-5	0		SOAKED AT 300F FOR 100 HRS. WHILE STRESSED TO 20% OF 300F. ULT. COMP. STR. VALUE	28.5	2.80	REDUCED SECTION	1
112-A-3				25.3	2.77	" "	1
113-A-6				30.0	2.85	" "	1
114-A-8				22.6	—	" "	1
AVERAGE				26.6	2.81		

CONVAIR — FORT WORTH

TABULATION SHEET

TABLE IV CONTD. COMPRESSION TESTS

181 CLOTH WITH CLASS IV (828)

SPECIMEN NO.	(1) ANGLE OF LOADING (DEGREES)	TEST TEMP. (F)	CONDITION	ULTIMATE COMP. STR. (KSI)	E_c / 10^6 (PSI)	LOCATION OF FAILURE		JIG AND STRAIN MEASUREMENT
111-A-7	0	500	SOAKED AT 500F	4.8	2.29	(3) END		1
112-A-7	↓	↓	FOR 1/2 HR.	4.7	2.20	REDUCED	SECTION	1
113-A-7	↓	↓	↓	4.5	1.67	"	"	1
114-A-7	↓	↓	↓	3.6	—	"	"	1
AVERAGE				4.3	2.05			
111-B-5	45	↓	↓	3.8	—	REDUCED	SECTION	1
112-B-5	↓	↓	↓	3.8	—	"	"	1
113-B-5	↓	↓	↓	3.8	—	"	"	1
114-B-5	↓	↓	↓	3.6	—	"	"	1
AVERAGE				3.8	—			
111-C-5	90	↓	↓	4.5	1.93	REDUCED	SECTION	1
112-C-3	↓	↓	↓	3.4	—	"	"	1
113-C-5	↓	↓	↓	4.7	2.22	"	"	1
114-C-5	↓	↓	↓	4.0	1.85	"	"	1
AVERAGE				4.2	2.00			

CONVAIR — FORT WORTH

TABULATION SHEET

TABLE V COMPRESSION TESTS

143 CLOTH WITH CLASS II (4232)

SPECIMEN NO.	(1) ANGLE OF LOADING (DEGREES)	TEST TEMP. (F)	CONDITION	ULTIMATE COMP STR. (KSI)	E_c / 10^6 (PSI)	LOCATION OF FAILURE		JIG AND STRAIN MEASUREMENT
116-A-1	0	R.T.		53.6	3.75	REDUCED	SECTION	2
117-A-1	↓	↓		47.5	4.66	"	"	2
118-A-1	↓	↓		47.4	4.55	"	"	2
119-A-1	↓	↓		41.9	4.75	"	"	1
AVERAGE				47.6	4.43			
116-B-1	45	↓		23.6	1.09	REDUCED	SECTION	2
117-B-1	↓	↓		20.8	.91	"	"	2
118-B-1	↓	↓		23.9	1.20	"	"	2
119-B-1	↓	↓		22.6	1.15	"	"	1
AVERAGE				22.7	1.09			
116-C-1	90	↓		21.8	.76	REDUCED	SECTION	2
117-C-1	↓	↓		19.2	.85	"	"	2
118-C-1	↓	↓		21.2	.73	"	"	2
119-C-1	↓	↓		21.8	—	"	"	1
AVERAGE				21.0	.78			
116-A-2	0	300	SOAKED AT 300F	31.0	3.15	REDUCED	SECTION	2
117-A-2	↓	↓	FOR 100 HRS.	34.7	4.16	(2) END		2
118-A-2	↓	↓	↓	30.2	3.40	REDUCED	SECTION	2
119-A-3	↓	↓	↓	40.7	—	"	"	3
AVERAGE				34.0	3.57			

JIGS AND STRAIN MEASUREMENT

1 - CONVAIR BUILT LEAF TYPE

2 - LP406-B WITH B-3M EXTENSOMETER

3 - LP406-B WITH PC-7M COMPRESSSOMETER

(1) ANGLE BETWEEN LOAD AND WARP DIRECTION OF SPECIMEN

(2) - ULTIMATE COMP. STR. VALUE NOT INCLUDED IN AVERAGE

CONVAIR — FORT WORTH

TABULATION SHEET

TABLE V CONTD. COMPRESSION TESTS

143 CLOTH WITH CLASS II (4232) RESIN

SPECIMEN NO.	(1) ANGLE OF LOADING (DEGREES)	TEST TEMP. (F)	CONDITION	ULTIMATE COMP. STR. (KSI)	E_c 10^6 (PSI)	LOCATION OF FAILURE		JIG AND STRAIN MEASUREMENT
116-B-2	45	300	SOAKED AT 300F	15.6	.85	REDUCED	SECTION	2
117-B-2			FOR 100 HRS.	16.2	.82	"	"	2
118-B-2				18.8	.89	(2) END		2
119-B-2				16.2	—	REDUCED	SECTION	3
AVERAGE				16.0	.85			
116-C-2	90			14.0	.69	REDUCED	SECTION	2
117-C-2				14.5	.77	"	"	2
118-C-2				15.0	.94	"	"	2
119-C-2				14.9	—	"	"	2
AVERAGE				14.6	.80			
116-A-3	0		SOAKED AT 300F	39.8	4.01	REDUCED	SECTION	3
117-A-3			FOR 100 HRS. WHILE	33.9	4.64	"	"	3
118-A-3			STRESSED TO 20% OF ROOM	34.1	3.98	"	"	3
119-A-3			TEMP. ULT. COMP. STR VALUE	33.4	3.58	"	"	3
AVERAGE				35.3	4.05			
116-A-4	0		SOAKED AT 300 F	41.0	4.90	REDUCED	SECTION	3
117-A-4			FOR 100 HRS. WHILE	36.7	4.25	"	"	3
119-A-4			STRESSED TO 40% OF ROOM	33.1	3.80	"	"	3
AVERAGE			TEMP. ULT. COMP STR VALUE	36.9	4.32			

CONVAIR — FORT WORTH

TABULATION SHEET

TABLE V CONT'D. COMPRESSION TESTS

143 CLOTH WITH CLASS II (4232) RESIN

SPECIMEN NO.	(1) ANGLE OF LOADING (DEGREES)	TEST TEMP. (F)	CONDITION	ULTIMATE COMP. STR. (KSI)	E_L 10^6 (PSI)	LOCATION OF FAILURE		JIG AND STRAIN MEASUREMENT
116-A-5	0	500	SOAKED AT 500F	25.2	3.93	REDUCED	SECTION	1
117-A-5	↓	↓	FOR ½ HR.	28.2	4.17	"	"	1
118-A-5	↓	↓	↓	21.4	3.71	"	"	1
119-A-2	↓	↓	↓	15.5	—	"	"	1
AVERAGE				22.6	3.94			
116-B-3	45	↓	↓	9.0	.71	REDUCED	SECTION	1
117-B-3	↓	↓	↓	10.8	.76	"	"	1
118-B-3	↓	↓	↓	9.6	—	"	"	1
119-B-3	↓	↓	↓	8.5	.69	"	"	1
AVERAGE				9.5	.72			
116-C-3	90	↓	↓	8.7	.63	REDUCED	SECTION	1
117-C-3	↓	↓	↓	8.7	.72	"	"	1
118-C-3	↓	↓	↓	7.2	.68	"	"	1
119-C-3	↓	↓	↓	7.1	.74	"	"	1
AVERAGE				7.9	.69			

CONVAIR — FORT WORTH

TABULATION SHEET

TABLE VI COMPRESSION TESTS

143 CLOTH WITH CLASS III (506) RESIN

SPECIMEN NO.	(1) ANGLE OF LOADING (DEGREES)	TEST TEMP. (F)	CONDITION	ULTIMATE COMP STR. (KSI)	E_c 10^6 (PSI)	LOCATION OF FAILURE	JIG AND STRAIN MEASUREMENT
121-A-1	0	R.T.		63.4	4.90	(2) END	2
122-A-1	↓	↓		74.4	6.33	REDUCED SECTION	2
123-A-1	↓	↓		75.9	5.04	" "	2
124-A-1	↓	↓		71.9	5.43	(2) END	2
AVERAGE				75.2	5.43		
121-B-1	45	↓		27.9	2.25	REDUCED SECTION	2
122-B-1	↓	↓		24.0	2.37	" "	2
123-B-1	↓	↓		26.5	1.97	" "	2
124-B-1	↓	↓		26.4	2.17	" "	2
AVERAGE				26.2	2.19		
121-C-3	90	↓		20.8	2.06	REDUCED SECTION	2
122-C-1	↓	↓		22.7	2.03	" "	2
123-C-1	↓	↓		26.0	2.21	" "	2
124-C-1	↓	↓		22.2	1.82	" "	2
AVERAGE				22.9	2.03		
121-A-3	0	300	SOAKED AT 300F	52.3	4.64	(2) END	2
122-A-2	↓	↓	FOR 100 HRS.	57.4	5.35	REDUCED SECTION	2
123-A-3	↓	↓	↓	48.4	4.12	(2) END	2
124-A-3	↓	↓	↓	65.4	4.32	REDUCED SECTION	2
AVERAGE				61.4	4.61		

JIGS AND STRAIN MEASUREMENT

1 — CONVAIR BUILT LEAF TYPE

2 — LP406-B WITH B-3M EXTENSOMETER

3 — LP406-B WITH PC-7M COMPRESSOMETER

(1) ANGLE BETWEEN LOAD AND WARP DIRECTION OF SPECIMEN

(2) ULTIMATE COMP. STR. VALUE NOT INCLUDED IN AVERAGE

CONVAIR — FORT WORTH

TABULATION SHEET

TABLE VI CONTD. COMPRESSION TESTS

143 CLOTH WITH CLASS III (506) RESIN

SPECIMEN NO.	(1) ANGLE OF LOADING (DEGREES)	TEST TEMP. (F)	CONDITION	ULTIMATE COMP STR. (KSI)	Ec 10^6 (PSI)	LOCATION OF FAILURE	JIG AND STRAIN MEASUREMENT
121-B-2	45	300	SOAKED AT 300F	22.6	1.85	REDUCED SECTION	2
122-B-2	↓	↓	FOR 100 HRS.	26.7	2.17	" "	2
123-B-2	↓	↓	↓	19.7	2.43	" "	2
124-B-2	↓	↓	↓	14.6	2.44	(2) END	2
AVERAGE				23.0	2.22		
121-C-5	90	↓	↓	16.1	1.59	REDUCED SECTION	2
122-C-2	↓	↓	↓	21.1	2.04	" "	2
123-C-3	↓	↓	↓	16.9	2.11	" "	2
124-C-3	↓	↓	↓	18.0	1.91	" "	2
AVERAGE				18.0	1.91		
121-A-5	0	500	SOAKED AT 500F	30.3	5.49	REDUCED SECTION	1
122-A-3	↓	↓	FOR 1/2 HR.	43.8	5.37	" "	1
123-A-5	↓	↓	↓	20.3	3.74	(2) END	1
124-A-7	↓	↓	↓	32.7	4.99	REDUCED SECTION	1
AVERAGE				35.6	4.90		
121-B-3	45	↓	↓	14.3	1.57	REDUCED SECTION	1
122-B-5	↓	↓	↓	16.4	1.90	" "	1
123-B-3	↓	↓	↓	15.5	1.63	" "	1
124-B-5	↓	↓	↓	15.5	1.77	" "	1
AVERAGE				15.4	1.72		
121-C-3	90	↓	↓	14.1	—	REDUCED SECTION	1
122-C-3	↓	↓	↓	11.5	1.73	" "	1
123-C-5	↓	↓	↓	15.9	1.95	" "	1
124-C-4	↓	↓	↓	12.7	1.67	" "	1
AVERAGE				13.6	1.78		

CONVAIR — FORT WORTH

TABULATION SHEET

TABLE VII COMPRESSION TESTS

143 CLOTH WITH CLASS IV (328) RESIN

SPECIMEN NO.	(1) ANGLE OF LOADING (DEGREES)	TEST TEMP. (F)	CONDITION	ULTIMATE COMP STR (KSI)	E_c 10^6 (PSI)	LOCATION OF FAILURE	JIG AND STRAIN MEASUREMENT
126-A-1	0	R.T.		69.6	4.21	REDUCED SECTION	1
127-A-1				64.5	4.23	" "	1
128-A-1				59.5	3.90	" "	3
129-A-1				58.8	3.98	" "	3
AVERAGE				63.1	4.08		
126-B-1	45			23.2	1.33	REDUCED SECTION	3
127-B-1				25.0	1.27	" "	3
128-B-1				25.2	1.41	" "	3
129-B-1				25.4	1.54	" "	3
AVERAGE				24.7	1.39		
126-C-1	90			25.2	1.47	REDUCED SECTION	3
127-C-1				25.9	1.51	" "	3
128-C-1				23.5	1.41	" "	3
129-C-1				27.2	1.43	" "	3
AVERAGE				25.5	1.46		
126-A-2	0	300	SOAKED AT 300F	16.7	2.49	REDUCED SECTION	3
127-A-2			FOR 1/2 HR.	16.2	2.69	" "	3
128-A-2				18.9	2.98	" "	3
129-A-2				—	3.02		3
AVERAGE				17.3	2.80		

JIGS AND STRAIN MEASUREMENT.

1 - CONVAIR BUILT LEAF TYPE

2 - LP406-B WITH B-3M EXTENSOMETER

3 - LP406-B WITH PC-7M COMPRESSOMETER

(1) ANGLE BETWEEN LOAD AND WARP DIRECTION OF SPECIMEN

CONVAIR — FORT WORTH

TABULATION SHEET

TABLE VII CONTD. COMPRESSION TESTS

143 CLOTH WITH CLASS IV (828) RESIN

SPECIMEN NO.	(1) ANGLE OF LOADING (DEGREES)	TEST TEMP. (F)	CONDITION	ULTIMATE COMP STR. (KSI)	E_c 10^6 (PSI)	LOCATION OF FAILURE		JIG AND STRAIN MEASUREMENT
126-B-2	45	300	SOAKED AT 300F	3.3	—	DELAMINATION IN REDUCED SECTION		3
127-B-2	↓	↓	FOR 1/2 HR.	3.5	—	DITTO	ABOVE	3
128-B-2	↓	↓	↓	5.9	—	DITTO	ABOVE	3
129-B-2	↓	↓	↓	3.1	—	DITTO	ABOVE	3
AVERAGE				4.0	—			
126-C-2	90	↓	↓	6.1	.50	DELAMINATION IN REDUCED SECTION		3
127-C-2	↓	↓	↓	6.7	.69	DITTO	ABOVE	3
128-C-2	↓	↓	↓	5.8	.50	DITTO	ABOVE	3
129-C-2	↓	↓	↓	5.7	.37	DITTO	ABOVE	3
AVERAGE				6.1	.52			

CONVAIR — FORT WORTH
TABULATION SHEET

TABLE VIII COMPRESSION TESTS

120 CLOTH WITH CLASS II (4232) CLASS III (506) OR CLASS IV (828) RESINS

SPECIMEN NO.	TYPE RESIN	(1) ANGLE OF LOADING (DEGREES)	TEST TEMP. (F)	CONDITION	ULTIMATE COMP STR. (KSI)	$\frac{E_C}{10^6}$ (PSI)	LOCATION OF FAILURE	JIG AND STRAIN MEASUREMENT
131-A-1	4232	0	R.T.		29.8	2.10	REDUCED SECTION	3
132-A-1					36.2	2.37	" "	3
133-A-1					32.7	2.25	" "	1
134-A-1					27.1	1.91	" "	1
AVERAGE					31.5	2.17		
131-A-2			500	SOAKED AT 500F FOR 1/2 HR.	14.3	1.93	REDUCED SECTION	1
132-A-2					11.9	2.38	" "	1
133-A-2					15.5	—	" "	1
134-A-2					20.8	—	" "	1
AVERAGE					15.6	2.16		
136-A-1	506		R.T.		37.5	3.70	(2) END	3
137-A-1					47.8	3.04	REDUCED SECTION	3
138-A-1					48.0	3.13	(2) END	3
139-A-1					40.7	3.14	REDUCED SECTION	3
AVERAGE					44.3	3.25		
141-A-1	828		R.T.		42.6	2.61	REDUCED SECTION	3
142-A-1					41.5	2.49	" "	3
143-A-1					44.4	2.15	" "	3
144-A-1					47.9	—	" "	3
AVERAGE					44.1	2.42		

JIGS AND STRAIN MEASUREMENT.
1- CONVAIR BUILT LEAF TYPE
2- LP406-B WITH B-3M EXTENSOMETER
3- LP406-B WITH PC-7M COMPRESSOMETER

(1)- ANGLE BETWEEN LOAD AND WARP DIRECTION OF SPECIMEN
(2) ULTIMATE COMP STR. VALUE NOT INCLUDED IN AVERAGE

CONVAIR — FORT WORTH

TABULATION SHEET

TABLE IX COMPRESSION TESTS

181 CLOTH WITH CLASS II (4232) CLASS III (506) OR CLASS IV (828) RESINS

SPECIMEN NO.	TYPE RESIN	(1) ANGLE OF LOADING (DEGREES)	TEST TEMP (F)	CONDITION	ULTIMATE COMP STR. (KSI)	E_c 10⁶ (PSI)	LOCATION OF FAILURE	JIG AND STRAIN MEASUREMENT
146-A-1	4232	0	R.T.		28.6	2.83	REDUCED SECTION	3
147-A-1					29.4	2.88	" "	3
148-A-1					22.3	2.71	" "	1
149-A-1					21.4	2.97	" "	1
AVERAGE					25.4	2.85		
146-A-2			500	SOAKED AT 500F	11.7	—	REDUCED SECTION	1
147-A-2				FOR 1/2 HR.	12.3	—	" "	1
148-A-2					13.5	—	" "	1
149-A-2					9.6	—	" "	1
AVERAGE					11.8	—		
151-A-1	506		R.T.		45.3	3.48	REDUCED SECTION	3
152-A-1					40.5	3.44	" "	3
153-A-1					52.2	3.10	" "	3
154-A-1					34.2	3.25	" "	3
AVERAGE					43.1	3.32		
156-A-1	828		R.T.		44.5	2.77	REDUCED SECTION	3
157-A-1					45.9	3.05	" "	3
158-A-1					46.3	2.84	" "	3
159-A-1					44.2	3.32	" "	3
AVERAGE					45.2	3.00		

JIGS AND STRAIN MEASUREMENT

1 - CONVAIR BUILT LEAF TYPE

2 - LP406B WITH B-3M EXTENSOMETER

3 - LP406B WITH PC-7M COMPRESSOMETER

(1) - ANGLE BETWEEN LOAD AND WARP DIRECTION OF SPECIMEN

UNCLASSIFIED